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JUSTIFICATION FOR CONTINUING TRACKLESS TROLLEYS IN SAN FRANCISCO

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LOCAL UNION NO. 6

International Brotherhood of Electrical Workers

55 FILLMORE STREET · SAN FRANCISCO, CALIF. 94117 · 861-5752

April 2, 1969

Dear Sir:

We are pleased to submit the enclosed report which presents the results of an extensive research on the control of Air Pollution and the use of trackless trolleys.

We point specifically to the comparison between the electrically powered trolley coaches versus the internal combustion engines powered by gasoline and diesel fuel. You will find a complete report titled, "AIR POLLUTION REPORT", which was made on the city of Seattle, Washington. This report, we feel, definitely reflects the situation in our city of San Francisco. In fact, the situation is more acute here because of the concentration of smog within our forty-nine square mile area. We also call your attention to the section titled, "TRUTH ABOUT TRANSIT", also based on the Seattle area. We selected the Seattle area because the terrain is similar to San Francisco. We call your particular attention to pages 10 through 16, and pages 22 through 24 of this section.

The fact that we are spending many millions of dollars through our Air Pollution Control Agency to protect our people from the deadly emission of poisonous fumes must be considered. We should not add to their problems by doing away with electric powered transportation. Those two overhead trolley wires mean clean air instead of the deadly air pollution caused by smog. Which do we want?

Cost savings, quality improvements and cleaner air will be among the benefits of electric transportation.

Your attention is called to the summary on pages 19, 20 and 21, on which the "no smog - no fumes" trolley coach matter is presented. Also, the economy factor of trolley coach operations is presented plus flexibility through the use of the self-contained power pack.

A thorough study of this brochure will prove electrically powered vehicles, including trolley coaches, are superior to gas and diesel buses.

Yours very truly,

Franz E. Glen

Franz E. Glen
Business Manager-Financial Secretary

FEG:tdm
OPE-3 AFL-CIO (37)

REPORT ON MUNICIPAL RAILWAY TRANSIT EQUIPMENT

This is a report of upkeep, comparative replacements, repairs, etc., of Electric Trolley Coaches compared with Motor Busses (hereinafter referred to as Diesel Busses). The effects upon costs of operations is not described in dollars and cents literally. This report points out replacement cost factors in improvement which can benefit the Muni Service to the public and the City.

Notable are comparisons of mileage and the ratio of mileage given by the Trolley Coaches (which is above average mileage compared to the Diesels). All these factors should be considered in assessing the amount of service a vehicle can produce. The amount of vehicles in operation, as listed below, does show a far greater number of Diesel (gas driven) Busses as compared to Electric Trolleys:

Trolley Coaches - 35%
Diesel Busses - 65%

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SPECIAL NOTE

THE ENCLOSURE MARKED "CHARTER AMENDMENT ARTICLE XXIV AND THE TRUTH ABOUT TRANSIT" REFERS TO THE CITY OF SEATTLE, WASHINGTON. THE TERRAIN IN SEATTLE IS ABOUT THE SAME AS SAN FRANCISCO, SOME GRADES STEEPER. WE FEEL THE INFORMATION REGARDING ELECTRIC COACHES VS. DIESELS APPLIES TO SAN FRANCISCO.

EXHIBIT I - MILEAGE AND PASSENGERS

January 1, 1967 through November 30, 1967

1. Trolley Coaches travelled approximately 7,500,000 miles

 Diesel Busses " " 13,000,000 miles

 (Trolley Coach travel was about 40% less than Diesel Busses due to the lower ratio of Trolley Coaches used over this period of time (January, 1967 through November, 1967).

2. Passengers hauled over same period:

 Trolley Coaches - 67,000,000 (Approximate)

 Diesel Busses - 83,000,000 (Approximate)

Thus, while the ratio of Trolley Coaches to Diesel Busses used remained at about 35%, the difference in passengers carried was only 6,000,000. Therefore, the Trolley Coaches consistently carried more passengers per vehicle than the Diesel Busses.

EXHIBIT I - (Cont'd)

3. Between March 15, 1968 and June 2, 1968, the ratios between trolley coaches remained about the same. 339 Trolley Coaches are now in operation while the Diesel Busses number 524. Now in service there are a total of 863 rubber-tired transit vehicles. The ratios remain approximately as follows:

Trolley Coaches - 35% plus

Diesel Busses - 65% minus

Note the "Plus" for percentages of trolley coaches and "Minus" for diesel bus percentage. Whereas the present-operating trolley coaches can remain in service and operation another five to ten years, the diesel busses consistently are placed in "dead-storage" - scrapped and/or written off as an age and wear factor.

EXHIBIT II - ROUTES

During the reconstruction period several of the old worn-out streetcar lines of the previous Market Street Railway Company were (very wisely) replaced by Trolley Coaches, in order to assure proper service over the heaviest trafficked streets and hilly areas.

The busiest streets and intersections where Stop-and Go service is the heaviest are: Market; Mission; Howard; South Van Ness; Fillmore; Van Ness; Portrero and Haight Streets.

Steep grades are encountered on the following routes:

22 Fillmore	7 Haight
21 Hayes	33 Haight & Stanyan ("Over the Hill"
6 Masonic	to 18th Street to Harrison Street)

These grades are easily negotiated by Trolley Coaches. A Trolley Coach at dead-stop on any of these grades is capable of reaching full speed within a half block; whereas a "Gas Bus" or Diesel Bus will be noisily puffing and smoking along in compound low at a leisurely pace of one mile an hour --- holding up traffic and producing FUMES AND SMOG, until it finally reaches the top of the grade.

EXHIBIT II - (Cont'd)

As noted below, gas and diesel busses continuously emit SMOKE, FUMES, AND SMOG while in operation during two other stages of operation "en route".

1. Gas or diesel busses going uphill require more power from the combustion motor, which must burn more gas or diesel fuel; this in turn, producing more SMOKE, FUMES AND SMOG.

2. All drivers of Gas and Diesel busses have been instructed to TURN OFF the motor at the end of the line IN ORDER TO REDUCE EXHAUST FUMES (SMOG) AND NOISE.

 Starting and revving up a combustion motor actually produces more SMOG AND NOISE. This procedure entails the use of more gas whether it be on a level road or hilly terrain.

— — — — — — — —

TROLLEY COACHES HAVE NO TROUBLE OF THIS SORT - FOR THE REASONS OUTLINED BELOW:

1. COMBUSTIBLE FUEL IS NOT USED BY TROLLEY COACHES!

2. UPGRADES DO NOT SLOW-DOWN THE TROLLEY COACHES!

3. AT STOPS OF ANY KIND --- THE ELECTRIC TRACTION MOTOR AUTOMATICALLY STOPS WITHOUT SHIFTING OF GEARS, SMOOTHLY AND EFFORTLESSLY (AS WELL AS ODORLESS) -- THE ELECTRIC MOTOR "REVS UP" TO THE REQUIRED SPEED WITH VERY EFFICIENT EASE.

 NO NOXIOUS GASSES ARE EMITTED AND NO SMOG IS CREATED IN CONTRAST TO GAS BUGGIES.

EXHIBIT III - TIRE MILEAGE

The tires of the Trolley Coaches (new and recapped) have consistently lasted longer than the identical tires placed on the Diesel Busses. Their endurance factors are another facet to the sterling phrase: "The Trolley Coaches are 'carrying the Load' for the entire Muni Railway in savings on the contract."[1]

		Approx. per Tire
The average Life-Rate of new and recapped tires used on Trolley Coaches over the years	---	128,620 miles
New and recapped tires used on the Diesel Busses	---	82,090 miles
		46,530*

*This figure indicates that over the many years, tires (new and recaps) used on Trolley Coaches, have outlasted those used on Diesels, by an average of 46,530 miles.

From August through December of 1967, tires used on Trolley Coaches out-averaged identical tires used on Diesel Busses, by more than 55,300 miles.

This higher tire mileage of Trolley Coaches, PLUS THE SAVINGS IN COSTS, is credited to the smooth and efficient operation of Trolley Coaches.

[1] According to a Representative of General Tire Company, who was in charge of the Tire Lease Contract with the Muni Railway.

EXHIBIT III - (Cont'd)

As a matter of fact, the high-mileage tire wear credited to Trolley Coaches have occasioned rebates to the Railway in amounts ranging from $17,000 to $18,000. This higher tire mileage and incidental savings is credited to the smooth, efficient operation of Trolley Coaches.

FROM AUGUST 1967 THROUGH DECEMBER 1967, THE AVERAGE TIRE MILEAGE WAS AS FOLLOWS:

Trolley Coaches - New & Recapped Tires - 136,845 average miles per tire

Diesel Busses - New & Recapped Tires - 81,516 average miles per tire

TOTAL DIFFERENCE - TROLLEY COACHES *55,327 miles

Shows that tires used on Trolley Coaches, August thru December 1967, averaged 55,327 miles more than identical tires used on Diesel Busses.

THUS, IN THE INTEREST OF ECONOMY, TROLLEY COACH TIRE COSTS ARE FAR BELOW TIRES USED ON DIESEL BUSSES.

EXHIBIT IV - BRAKES AND BRAKE LINING

Brake mileage of individual Trolley Coaches:

"a" - 141,610 miles -- New Brake Lining
"b" - 130,932 " " " "
"c" - 122,397 " " " "
"d" - 114,161 " " " "

The average mileage of brake lining of these Trolley Coaches - 127,024 miles prior to re-lining. (This is typical of the generally high mileage of the brake life of the Trolley Coaches).

This high mileage of brake life is no doubt due to use of the ELECTRIC DYNAMIC BRAKING in use on Trolley Coaches. The remarkable tire-wear-average on Trolley Coaches is also attributed to the use of Dynamic Brakes, plus the smoothness of acceleration of the electric motor.

After approximately 20 years of service, many of the Trolley Coaches are STILL FUNCTIONING PERFECTLY WITH THEIR ORIGINAL BRAKE DRUMS. ALSO REMARKABLE, IS THE FACT A TROLLEY COACH DOES NOT REQUIRE AN AIR COMPRESSOR FOR BRAKING PURPOSES.

Diesel Busses: These busses, using air-operated brakes, get 20,000 to 25,000 miles per set of brake drums. Thus, DIESEL BUSSES ARE OUT-OF-SERVICE DUE TO BRAKE REPAIR AND BRAKE LINING, AT LEAST THREE AND OFTEN FOUR TIMES TO ONCE FOR THE TROLLEY COACHES.

EXHIBIT V - ELECTRICAL MOTORS

Trolley Coaches are powered by means of a 140 Horsepower, Direct Current Electric Motor, controlled by a closely calibrated electrical control system designed for proper acceleration and Dynamic Braking. This motor, its controls and relay switches (see Exhibit VI - Switch Groups) constitute the "heart" of the Trolley Coach. This assures efficient, smooth operation and an extremely low vibration factor. This smooth operation assures passengers of a more comfortable ride than that which is possible in the operation of Diesel Busses.

The lack of vibration is another factor in the low cost of upkeep of Trolley Coaches. They are so equipped as to prevent the coach from shaking itself to pieces.

Trolley Coach motor overhaul is usually a routine matter. Such overhaul usually consists of cleanup, dipping of armatures and field coils in insulating varnish, testing for shorts and grounds (which may be discovered and corrected during overhaul periods), turning and undercutting of commutators, checking armature shaft, and changing bearings, if necessary. The ball type bearings, one on each end of the shaft, protect the shaft and give extremely long wear.

EXHIBIT V - (Cont'd)

I L L U S T R A T I O N : Quoted from Service Report, Muni Railway, Elkton Shop.

> "Trolley Coach 529 reached 200,000 miles on March 4, 1955. Brought to shop, was dismantled, inspected and put through the tests. Those present were: a group of engineers from the General Electric Company, Mr. B. Corley, Supervisor of Electric Propulsion, and William Roddick, Foreman of the Electric Motor Shop.
> THE MOTOR WAS EXAMINED THOROUGHLY AND FOUND TO BE IN EXCELLENT CONDITION".

After the regular routine work (described above) was completed, this motor was reassembled and put back into service.

THIS IS TYPICAL OF PRACTICALLY ALL OF THE TROLLEY COACH MOTORS.

These sturdy motors are securely suspended under the Trolley Coach "just south of center", and the rear end, "double reduction" gear delivers the traction power to the rear wheels. Speed changes are controlled by means of the electric accelerator device which cuts in and cuts out resistance. Thus, our Trolley Coaches can move without strain from one mile per hour to top speeds; 50 miles per hour, if necessary.

TROLLEY COACH MOTOR CHANGE. Whenever it becomes necessary to "pull" a motor for repairs or overhaul, a standby motor in perfect condition is available on hand to replace the motor "pulled". It is estimated the time required to "pull" and replace a trolley coach motor averages less than six hours, as against pulling and replacing a diesel or gas bus combustion motor taking up to three times longer.

After approximately 20 years of service, the majority of Trolley Coaches are still functioning perfectly with their original motors.

EXHIBIT V - (Cont'd)

The overhaul of these electric traction motors does not involve work on parts necessary to the operation of a combustion motor, such as pistons, wrist pins, crank shafts, piston rods, crank shaft bearings, camshafts, intake and exhaust valves, oil and water pumps, or exhaust pipes. It has been proven that many of these parts contribute to the continuous high vibration factor common to the operation of a smoky combustion motor, THEREBY ADDING CONSIDERABLY TO THE COST OF MAINTENANCE AND UPKEEP.

All these factors indicate the Trolly Coach far superior to the Diesel or other busses which are dependent upon a SMOKY, SMOG, AND FUME PRODUCING COMBUSTION MOTOR FOR THEIR SOURCE OF POWER.

Some of the trolley coaches have been retired to "dead storage" after continuous operation of over 20 years. This was certainly not because they could not continue, but due to finances for construction ran out and some of the lines planned for construction were not built, leaving the Muni with a surplus of trolley coaches.

The question is - Will the Muni have to include a greatly enlarged supply of spare Diesel Combustion Motors in the next Bond Issue? Or, in the interest of service and economy phase in new Trolley Coaches to accommodate the present Trolley Coach routes. (This should be done in the interest of CONTINUOUS GOOD SERVICE AND ECONOMY).

EXHIBIT VI - SWITCH GROUPS

CONTROLS: The electrical start, stop and speed controls of Trolley Coaches are designed to provide smooth operation through a controller, which cuts in and cuts out resistance. This is done by depressing the power pedal (accelerator) which activates various switches with a minimum of "flash" or heavy arcing, contributing to smooth operation.

Incidentally, after the many years of operation, these switch groups are in excellent condition. General inspection was made to determine if replacement would be necessary for these switch groups and it was found that due to the fact these switch groups are so arranged as to be readily accessible to Electrical Maintenance Mechanics (plus the "Low-Flash" Factor), this equipment was in excellent condition. Neither general overhaul nor major replacement of parts was required at that time.

EXHIBIT VII - BODIES

One would deduce that the rugged duty required of the trolley coaches -- such as ascending steep grades, maneuvering in heavy traffic, etc., the bodies would be due for replacement. However, due to the extremely low vibration factor and the factors of rugged design but light weight aluminum, these busses look newer and less worn than their counterparts --- the gas buggies. In fact, it may be said, they are generally as good today as the day they were placed into service.

NOTE: White Motor Busses (with combustion engines) were put into service at the same time. The White Busses are long since gone --- only a few are retained for occasional use for emergency service or to fill in runs when smoky Diesel Busses are laid up for overhaul. IT IS DIFFICULT TO DETERMINE WHICH, GAS BUS OR DIESEL, CREATES THE MOST SMOG AND FUMES.

EXHIBIT VIII

OVERHEAD POWER SYSTEM FOR TROLLEY COACHES

There has been some objection to Trolley Coaches based upon the fact that overhead trolley wires and feeder systems transmit the power to these lines. The residents and riders of public transportation systems have expressed preference for electric trolley coaches. Tourists to this city not only like the cable cars and trolley coaches, but some exclaim they would not come to San Francisco were it not for the cable cars and trolleys. They have openly expressed their displeasure at the fumes and smog emitted by gas and diesel busses and inquire as to why more trolleys are not used instead of these gas busses. DEFINITELY NOT, IS THE ANSWER TO ELIMINATION OF ELECTRIC COACHES.

The public transportation users express preference for trolley coaches as against gas busses and diesels, for the following reasons:

1. TROLLEY COACHES ARE NOTICEABLY QUIETER IN COMPARISON TO NOISY GAS AND DIESEL BUSSES.
2. THE AGGRAVATORS OF LUNG DISEASE AND EMPHYSEMA ARE MANUFACTURED BY THE GAS AND DIESEL ENGINES, NOTABLY - SMOG, FUMES, IRRITANTS -- AS WELL AS NOISE.

EXHIBIT VIII - (Cont'd)

3. TROLLEY COACHES ARE SMOOTHER RIDING THAN GAS OR DIESELS. THIS MAY SEEM A SMALL MATTER, BUT IT IS QUITE IMPORTANT TO PASSENGERS WHO HAVE EXPERIENCED SUDDEN STOPS AND LURCHES IN GAS BUSSES, NOT TO SAY PERSONS WHO HAVE BEEN THROWN BY SUDDEN BRAKING MANIPULATIONS ON THE PART OF THE OPERATORS OF GAS BUSSES.

4. THE STEEP-GRADE ROUTES ARE SMOOTHLY AND EASILY ASCENDED BY THE TROLLEY COACHES. QUICKER AND EASIER ASCENSION ON THESE UPGRADES ARE THE RULE FOR THESE COACHES AS AGAINST THE SLOWER DIESELS AND GAS BUSSES.

In the interests of economy the following is recommended:

a) A proper Trolley Coach System will in the long run provide superior service and will be less costly than any other part of the Municipal Railway Transit Systems.

b) The combination of street lighting, traffic signals, and Muni Railway power poles will contribute towards efficiency and economy (Dual or Triple purpose poles).

There is no reason why modern steel combined street lighting, traffic signals, and trolley power poles cannot be installed for this dual or triple purpose. In the case of feeders they should be installed in underground conduits.

EXHIBIT VIII - (Cont'd)

c) Underground feeders (600 volts D.C.), would also be in the interest of better service and economy. This will have to be done in any case. (Sooner or later all overhead lines must be transferred to underground P.G.&E., Telephone and Fire Alarms, etc. This includes all stteet lighting circuits.

d) Despite the factor of the suspended twin trolley wires over streets where trolley coaches travel their use at the present time is still more tolerable than inhaling the gaseous fumes of the diesels, especially in residential neighborhoods where a bit of fresh air and an abatement of noise would be highly desired.

The present-day directors of the public transportation systems should and can utilize and exploit the possibilities and capabilities of the Electric Trolley System.

EXHIBIT IX

NEW TROLLEY COACHES

TROLLEY LINE POWER FAILURE - EMERGENCY POWER PACK. On All types of public transportation vehicles, whether they be trolley or gas or diesel, equipment failures do occur. For some reason or other, trolley coaches have been singled out as the scapegoats and the breakdowns of gas coaches are not as widely publicized.

Listed below we find causes and solutions to motor failures:

1. When this occurs to a gas bus, diesel bus, or trolley coach, the procedure is generally the same. Either tow the vehicle away to the garage or shop, or call the mechanic to attempt to correct the motor failure.

2. In the case of trolley coaches stalling because of power line failures:

 a) The present method is to wait until power comes on and transfer passengers to another waiting vehicle.

 b) The near future method will be to pull down the twin-trolley poles and prepare the trolley coach or coaches to proceed on their own power by means of a self-contained power pack.

The Muni at present does not own any trolley coach with a self-contained power pack, but, such trolley coaches can be made available through the large electrical manufacturing companies, such as General Electric and Westinghouse.

EXHIBIT IX - (Cont'd)

Just recently Westinghouse Electric Manufacturing Co., has indicated that they will accept an order for new, modernized trolley coaches to be designed according to the purchaser's needs. And, it is noted, these newly-designed electric trolley coaches will contain an electrical power pack which will furnish sufficient power to enable the coach to travel in excess of a mile.

In the case of power line failure or other obstruction these new trolley coaches can proceed to the next, nearest trolley coach route, make contact with the twin trolley lines and proceed to the passengers' destination or the nearest transfer point or terminal.

We foresee further improvement on this, and ultimately a power-packed, modern coach (with manufacturers, such as Westinghouse, General Electric, etc., vying to compete for contracting the manufacture of these coaches).

The powers-to-be wish to phase in the diesel busses and phase-out the trolley coaches. This might be proposed in the November 1968 Bond Issue ON THE SUPPOSITION THAT NO MANUFACTURERS ARE PRODUCING TROLLEY COACHES!

We stress that it will be better to "phase-in" a new fleet of modern trolley coaches, and "phase-out" some of the old ones. In fact, in the interest of the future of San Francisco, phasing-in more new trolley coaches, with power-pack, to replace those phased out, should definitely be set before the public. The public should be aware of the pros and cons of this matter as they have a stake in the City of San Francisco's transportation problems.

IN CONCLUSION, we have definite reports that three (3) major cities, Dayton, Ohio, Toronto, Canada and Seattle, Washington have GONE back to Trolley Coaches (PEOPLE'S VOTE).

Again, SMOG ISSUE, LOW MAINTENANCE COSTS, QUIETNESS OF OPERATION, LONGEVITY AND SMOOTH RIDING were the main factors in bringing back the Trolley Coaches to these cities.

Manufacturers are not building Trolley Coaches at the present time, however, General Electric and Westinghouse have assured us that they would build the components if ordered and St. Louis Car Co., Western Flyer Co., Marmon-Herrington Fageol Co. would build the bodies. LET US PRESENT THIS PROBLEM TO THE PEOPLE!!!

SUMMARY

SUMMARY

TROLLEY COACH CHARACTERISTICS

I. QUIET OPERATION: No unpleasant stops, starts, OR ACCELERATION NOISES. In this day of consternation over air pollution the absence of gas fumes and more insidious smoke adding to the already smoke-laden air is vital to all. Passengers and pedestrians need not be overpowered by gas blast-offs from the rear ends of diesel busses. Instead trolley coach passengers may arrive at their destinations undisturbed by noxious fumes and completely at ease after an efficient trolley coach ride.

II. SPEEDY, SELF-STARTING TRACTION MOTOR: Quick acceleration and dynamic braking assure positive and efficient Stop-and-Go. Warm-up of the Electric Traction Motor is unnecessary (IN FACT UNHEARD OF). Trolley coaches do not have to stand at the curb with the motor running, as the traction motor is "self-starting" through the efficient electric control system.

III. NO CONTAMINATION: The electrically-driven Trolley Coaches provide the cleanest, odorless type of transportation. No objectionable FUMES AND MURDEROUS SMOKE WILL FORCE THEIR WAY INTO THE LUNGS OF PASSENGERS AND BYSTANDERS. For instance, after a gas bus or diesel bus take-off, FUMES ARE ESPECIALLY NOXIOUS AND NOTICEABLE.

NOTE: It has been necessary on occasions to issue bulletins to caution drivers of Gas and Diesel Busses to turn off their motors while standing the busses at the curbside because of the SMOKE, SMOG AND FUMES!

THIS SMOKE AND FUME FACTOR IS A CONSTANT SOURCE OF ANNOYANCE TO PASSENGERS, PEDESTRIANS, MOTORISTS AND OCCUPANTS OF BUILDINGS ADJACENT TO BUS STOPS.

IV. PROPER SAN FRANCISCO REFLECTIONS: Trolley Coaches are homogeneous to San Francisco because of traffic factors (particularly ascending and descending steep grades and hills). And, with an eye towards the future -- electric coaches can be utilized as excellent "feeder" routes when Bay Area Rapid Transit becomes an intergral part of the city's transportation.

V. THE ELECTRIC TRACTION MOTORS outlast combustion motors by a ratio of about 4 to 1. Due to smooth electrical control operations, tires, brakes and brake lining outlast those used on gas or diesel busses. In the long run -- in planning for the future -- the upkeep and maintenance, as well as operational costs, are far more economical than any other mode of public transportation.

VI. CONTROLS: The electrical traction motor is controlled by a series of switch groups designed to start, stop and control the speed of the trolley coach. Emergency stops are controlled by means of deadman braking. The entire control system contributes to efficient and smooth operation.

VII. BODIES: The present condition of trolley coach bodies, after approximately twenty years of service, are in better condition than Diesel Bus bodies. This is due to the extremely low vibration factor of the electric traction motor as compared to the high vibration of combustion motors.

VIII. OVERHEAD POWER SYSTEM: There has been some objection to Trolley Coaches based upon the fact that overhead trolley wires and feeder systems are suspended from poles necessary to transmit power to the trolley coaches.

In any event poles will continue to be in use for street lighting and traffic signals.

Answers:

A. There is no reason why steel poles used for trolley coaches could not serve a dual or triple purpose, which is trolley wire suspension, street lights and traffic signals. Such dual or triple service poles would be in the interest of efficiency and economy.

B. Maintenance: Proper maintenance of these dual or triple service poles would guarantee a more attractive appearance than exists at present.

C. Feeder Lines: The present overhead feeder lines should be installed in underground conduits. This is the case in most of our traffic signals and street lights.

NOTE: Eventually all overhead feeder lines must be transferred to underground conduits or ducts, including P.G. & E., Telephone, Telegraph, Fire Alarm, etc.

IX. NEW TROLLEY COACHES WITH SELF-CONTAINED POWER PACK. (AID TO FLEXIBILITY): Trolley Coaches are very seldom subject to failure enroute except through power failure, which is a breakdown of a section of the power supply (or other obstructions).

New trolley coaches in the near future will be provided with a self-contained power pack (batteries).

Thus in case of a power failure or any other obstruction, Trolley Coaches will be enabled to continue to their destinations and/or transfer points by means of the self-contained POWER PACK, thereby accommodating the passengers without undue delay.

New trolley coaches with self-contained power pack can be made available through manufacturing companies such as Westinghouse Electric, General Electric, etc.

RECOMMENDATION: In the interest of economy, immediate attention should be given towards "phasing-in" a sufficient number of NEW TROLLEY COACHES with self-contained electric power-pack to replace trolley coaches which may be "phased-out."

The impending Bond Issue should include provisions for the eventual purchase of such new trolley coaches sufficient to replace the complete quota of those which will be "phased-out."

THIS RECOMMENDATION IS SUBMITTED IN THE INTEREST OF ECONOMY AND BETTER SERVICE.

CONCLUSIONS: The fleet of Trolley Coaches the City has at the present time are owned (not leased) by the City of San Francisco. These coaches are good for at least another ten years of excellent service. Rather than decreasing the Trolley Coach Fleet, additions should be made. These additions should be the policy, not only in the interests of improving Muni Railway service for the people, but with an eye towards complete coordination of the entire Bay Area Transit System.

* * * * * * *

AIR POLLUTION REPORT

File: 26.824
Committee of the Whole - City Council

SEATTLE CITY COUNCIL
SEP 23 3 42 PM '68

AN EXAMINATION OF THE CHARACTER AND EFFECT OF DIESEL BUS EMISSIONS, WITH RECOMMENDATIONS FOR MINIMIZING THEM

A report to the City Council of the
City of Seattle by the
AD HOC COMMITTEE FOR STUDY OF DIESEL EMISSIONS

COMMITTEE MEMBERS

A. R. Dammkoehler, Puget Sound Air Pollution Control Agency

Lawson A. Elliott, Jr., City of Seattle

Larry Coffman, Municipality of Metropolitan Seattle

James F. Hayward, Seattle Transit Commission

Peter Breysse, University of Washington

In addition, technical support was provided by

Henry Droege, Washington State Air Pollution Control Board

September 20, 1968

AD HOC COMMITTEE
for
STUDY OF DIESEL BUS EMISSIONS

SEATTLE CITY COUNCIL
Sep 23 3 42 PM '68

September 20, 1968

TO THE CITY COUNCIL OF
THE CITY OF SEATTLE

Honorable Members:

It is with pleasure that we submit the report requested by your Resolution No. 21608.

A. R. DAMMKOEHLER
Chairman

INTRODUCTION

This is an examination of the character and effect of air pollution from diesel-powered buses and recommendations on ways to minimize this pollution.

The two-months study involved representatives of the Puget Sound Air Pollution Control Agency, the City of Seattle, the Municipality of Metropolitan Seattle, the Seattle Transit Commission, and the Division of Environmental Health of the Department of Preventive Medicine, University of Washington. This committee used as resource agencies the above organizations, plus the General Motors Corporation and the Washington State Air Pollution Control Board.

The committee studied both the entire city and the Central Business District (CBD). The CBD study area was selected on the basis of available diesel bus emission data. Further, this approximate two and one-half square mile sector, comprising less than 1/35 of the city's area, receives approximately one-fourth of the diesel bus emissions.

It was determined that eight bus-transit systems now operate on regular schedules in or through the city. They are:

Seattle Transit System
Metropolitan Transit Corporation
Western Tours, Inc.
Western Greyhound Lines
Continental Trailways
Evergreen Trailways
Vancouver-Seattle Bus Co. (Trailways)
Island Bus Company

pollution load, they cause a large amount of smoke and odor complaints. It is well to keep in mind that when we consider individual pollutants, the diesel bus is responsible for about 7% of the vehicular oxides of nitrogen in the CBD, and an even greater portion of the nitrogen dioxide.

The role of the diesel engine in air pollution is little understood and it is possible that past data does not adequately reflect the real significance of diesel bus emissions. In recent laboratory experiments, some of the known exhaust components of gasoline and diesel engines have produced detrimental effects on animals undergoing laboratory experiments. Because of the results of these experiments and other recent information, the committee deems it prudent to take practical steps to minimize the amounts and concentrations of motor bus pollutants or to continue to use electric vehicles until more is known regarding their effects.

METHODS RECOMMENDED FOR MINIMIZING THE DIESEL BUS EMISSION QUANTITIES AND THEIR EFFECTS

The committee desires that it be made clear that the recommendations are made from the standpoint of air pollution control alone. Other factors, including the economic factors, were not believed to be a part of the charge of your resolution.

Recommendation 1: *

Since, from the standpoint of air pollution control, electric buses are superior, retain electrically powered buses where economically feasible and where it will not adversely affect the quality of service to the public until power sources producing lower emissions than diesels or more effective controls for diesels are available.

From the standpoint of control of air pollution, transportation systems which do not emit air pollutants are the most desirable. In this regard, electrically powered buses are superior to buses powered by internal combustion engines (gasoline, diesel, LPG) since they do not emit air pollutants. Consequently, existing electric powered lines should be retained as long as they can continue to provide dependable service, or until the availability of controls which effect significant reductions in diesel engine emissions, including oxides of nitrogen, become available.

On the other hand, transit systems can be effective in reducing air pollution by providing alternatives to automobile travel, but this is not likely to be possible unless they provide economical, speedy and convenient service. Any factor which keeps the systems from providing good service to the public discourages transit use and encourages resort to private automobiles.

* One committee member dissents from this recommendation and presents a modified recommendation.. See page 3A.

Recommendation 1*: (One member only)

Since, from the standpoint of air pollution control, electric buses do not produce any pollution, retain present electric system and consider extension of said system where short-run, low-mileage, high population density areas are served.

* This is the position of Peter A. Breysse who is the representative of the Department of Preventive Medicine, Division of Environmental Health, School of Medicine, University of Washington. The recommendation which was approved by all the other members is to be found on page 3.

Recommendation 2:

Minimize smoke emissions by techniques which improve combustion, including use of No. I diesel fuel, combustion-improving fuel additives of proven performance, improved fuel injection, and thorough and regular maintenance.

Many recent authoritative studies [3, 4, 7, 11, 12, 15, 17] clearly show that fuel additives which improve combustion are effective from the standpoint of reducing smoke as well as other pollutants and, to some extent, odor. It should be made clear that the committee makes no recommendation on the use of masking agents.

The additives (and one of these is being used by a local carrier) should be used in connection with a thorough maintenance program with use of No. 1 fuel to limit sulfur oxides emission, and replacement of S-type injectors with the N-type on the General Motors 2-cycle diesel engine which is the only engine being used at present.

Mr. H. O. Flynn, Chief Engineer for GMC Truck and Coach Division, General Motors Corporation, Pontiac, Michigan, presented information to the committee (a drawing from his presentation is included in this report) [9, 22] which demonstrated the air pollution advantages to be gained from the use of modern injectors, No. 1 diesel fuel, and proper maintenance.

It must be pointed out, however, that the increase in the compression ratio associated with installation of the N-injectors has been shown in one study [10] to increase oxides of nitrogen emission somewhat.

Recommendation 3:

Use proven catalytic mufflers on coaches which operate at higher, more continuous speeds, such as express buses and those using the freeways.

The catalytic muffler is a device attached to the exhaust system of a diesel engine to control emissions. The catalyst consists of chemically coated ceramic pellets which are contained between stainless steel grids. The exhaust gases are directed across the grids which cause the particles to be agitated and remain in intimate contact with the exhaust gases, resulting in a reaction which changes the composition of the exhaust.

According to Mr. Flynn, Chief Engineer, General Motors Truck and Bus Division, the exhaust gas temperatures must get up above 800 degrees F before the unit will begin to operate with any degree of effectiveness. This means that the catalytic muffler operates at its highest efficiency after the bus has gotten up to operating speed. On the average, he stated that the control unit reduced carbon monoxide and hydrocarbons approximately 50%, aldehydes about 30%, and had little or no effect on smoke and odors.

It can, therefore, be concluded that the use of the catalytic muffler is of very limited value for local bus service requiring frequent starting and stopping. The committee, therefore, only recommends its use on buses which operate at the higher, more continuous speeds.

Recommendation 4:

Field tests should be made to evaluate the overall effects, including the possibility of better dilution, to be gained by moving the exhaust outlets to the top of buses.

Stack effluent dispersion calculations [14] indicate that the high vertical exhaust would provide a dilution of the maximum concentrations on the order of 400:1 and thus would assist in minimizing the odor experienced by pedestrians and motorists. In addition, a recent study [7] showed that a sevenfold increase in dilution was provided for exhaust gases reaching a person in a car or on a

curb by installation of vertical stacks, and concluded that the vertical stack was, by itself, a kind of emission control.

The Boeing Company has purchased new diesel buses which, reportedly because of the large number of in-plant tours they are used for, are equipped with vertical exhaust outlets capped by flutter valves.

Vertical stacks have been recommended for buses in Washington, D.C. /8

The committee is aware that countering arguments include the practicability of the change, plus possible long-range pedestrian hazard, and the fact that tall stacks have been tried before (in Milwaukee, for example) and removed. The Massachusetts Bay Transit Authority reported opposition to the measure on February 29, 1968. /20

Recommendation 5:

Train all diesel bus drivers in techniques of operating the buses to minimize air pollutant emissions.

By avoiding unnecessary excessive acceleration and deceleration, nitrogen oxides and hydrocarbon emissions can be limited. /13, 16

In addition, drivers should be instructed to shut off engines at the end of the line or at other points where appreciable waiting time is involved.

Recommendation 6:

Consider relocation of some routes through neighborhood shopping districts to speed up the buses, separate pollutants from the greater numbers of people, and afford better dispersion of pollutants.

At various times in the past, bus lines have been considered for relocation. Merchants usually want the buses to establish stops at points which will be as convenient as possible for shoppers.

With the increasing concern now expressed by the general public about air pollution and the disagreeable exhaust products of internal combustion engines, the committee believes that it is time to consider relocation of lines around certain small neighborhoods.

Recommendation 7:

The appropriate public agency should adopt and enforce, as soon as practicable, the federal diesel smoke standards which are to take effect nationally in 1970, *or other applicable diesel engine emission standards.* [18]

The proven route to air pollution control is first, the development of criteria--that is, the correlation of levels and effects; second, the adoption of standards, a determination of the level of control needed; and finally, enforcement of the standards. The control of diesel engine emissions is a problem which lends itself to such a solution, and consequently is recommended by the committee.

Because the process of setting and adopting standards is usually a long one, no immediate benefits can be expected.

AN EXAMINATION OF THE CHARACTER AND EFFECT OF DIESEL BUS EMISSIONS

The major constituents (greater than 1%) of diesel exhaust are water, carbon dioxide, oxygen and nitrogen. Water and carbon dioxide are compounds which are of lesser importance from the air pollution standpoint than the minor components which include hydrocarbons, organic acids, aldehydes, alcohols, carbon monoxide, oxides of nitrogen, hydrogen, oxides of sulfur, and smoke.

EMISSIONS: /1

In terms of volumes, the principal gaseous pollutants in the exhaust of diesel buses are carbon monoxide, hydrocarbons, and oxides of nitrogen. The diesel bus contribution to total vehicular pollution is, areawise, small. Table I, following, is a tabulation of the approximate portions of these compounds which are contributed by diesel buses, expressed as percentages of total gasoline engine emissions.

TABLE I

Pollutant	Entire City of Seattle	Seattle CBD*
Carbon Monoxide	0.04%	.07%
Hydrocarbons	1.2%	2.8%
Oxides of Nitrogen	3.5%	7.4%

* The CBD is, for the purposes of this report, defined as the area from Denny Way on the north to Atlantic Street on the south, and from Elliott Bay on the west to 15th Avenue East and its projection.

Sulfur dioxide and particulates (smoke) production is not included in the table above. Sulfur oxides emission depends upon the sulfur content of the fuel used, and where premium fuel is used (sulfur content about 0.20 to 0.30%) sulfur oxides production is small. For diesel engines generally, according to the U. S. Public Health Service, sulfur oxide emission amounts to 2/3 the carbon

monoxide by weight, and particulate matter, about 1/2 the amount of oxides of nitrogen by weight. /6

EFFECTS OF THE PRINCIPAL EXHAUST PRODUCTS: /2

Oxides of Nitrogen

Depending upon engine design, loading and other factors, approximately 16 to 60% of the oxides of nitrogen in the diesel exhaust are present as nitrogen dioxide and the rest, nitric oxide. In the atmosphere the nitric oxide is converted to nitrogen dioxide. This reaction is speeded up when the nitric oxide is exposed to sunlight in the presence of hydrocarbons. In addition, the combination of nitrogen dioxide and hydrocarbons, plus sunlight exposure, results in photochemical smog.

The oxides of nitrogen are somewhat soluble in water, reacting with it in the presence of oxygen to form nitric and nitrous acid. The action can take place deep in the respiratory system. The acids formed, if in sufficient concentrations, will cause congestion of the throat and respiratory passages and edema of the lung.

Nitric oxide in the "test tube" acts like carbon monoxide in that it readily unites with hemoglobin. In animal experiments, however, little if any of the nitric oxide passes through the lung tissue to unite with the blood. At high levels of exposure, nitric oxides combine with hemoglobin to produce methemoglobin, which can lead to oxygen deficiency and central nervous system depression.

Nitrogen dioxide, on the other hand, is considered to be much more toxic than nitric oxide. Nitrogen dioxide is not highly irritating and thus does not give warning of its dangers. In acute exposure to nitrogen dioxide, the victim dies within a few hours or days after exposure, when blood serum pours through the

damaged tissue into the lungs such that the person literally drowns in his body fluids. If he survives, pneumonia or emphysema may develop.

Nitrogen dioxide can decrease resistance to airborne infectious micro-organisms. In one study, 50% more mice died when exposed to 5 parts per million (ppm) nitrogen dioxide, plus a pneumonia-producing bacteria, than when exposed to bacteria.

Further study indicates that rats exposed continuously to nitrogen dioxide developed emphysema. These rodents exposed to 4 parts per million (ppm) of nitrogen dioxide exhibited early symptoms of emphysema after only 16 weeks of exposure.

It should also be noted that cigarette smoke contains large amounts of nitrogen dioxide. A question is therefore raised concerning the additive effects of atmospheric concentrations of nitrogen oxides and those from smoking. It has been speculated that the combination of widespread low levels of nitrogen dioxide, plus the short-time contribution from smoking, may result in chronic obstructive respiratory disease. The answer to this question is further complicated by industrial exposure as well as other compounds such as particulates and sulfur dioxide which may enhance and add to the nitrogen oxide effects.

Some lung tumor acceleration due to repeated exposure to nitrogen dioxide has been reported. Nitrogen dioxide in daily exposures of 5 ppm appeared to mildly accelerate tumor formation in a strain of lung tumor-suscpetible mice.

Some scientists feel that nitrogen dioxide mimics radiation in a number of its effects and, like radiation, the only safe level may be zero. Since this is at present impossible to achieve, then serious consideration should be given to limiting exposures to nitrogen dioxide as low as possible.

Hydrocarbons

Hydrocarbon concentrations in diesel exhausts are generally lower than in gasoline-fueled engines. [4, 6, 20]

Some of the polycyclic hydrocarbons contained in diesel and automobile exhausts have been implicated as cancer-producing agents in animals. These compounds are released in diesel exhausts under conditions of inefficient operations. As mentioned previously, hydrocarbons also enter into photochemical reactions resulting in photochemical smog. The photochemical reactivity of heavy hydrocarbons in diesel exhausts have not been studied and, as a result, there is much need for information in this area. The heavier hydrocarbons in automotive emissions have been implicated in photochemical smog and probably substantial quantities of heavy components in diesel emissions will also be involved.

Odors

Much research is presently being performed in attempts to identify the individual odorants in diesel exhaust products. At present, the factors responsible for diesel odors are not well understood, and there is no proven control technology for diesel exhaust odors.

Irritants

The irritating compounds in diesel exhaust have not been firmly identified. Suspected contributors to eye and nasal passage irritations include the aldehydes such as acrolein and formaldehyde, both also produced in gasoline exhausts, and nitrogen dioxide, sulfur dioxide and particulates emitted primarily from diesels.

CONCENTRATIONS:

Since most of the informed concern has centered on the problem of oxides

of nitrogen, air samples were taken in downtown Seattle to ascertain concentrations. These samples, which were taken by the Washington State Air Pollution Control Board at 4th and Pine on August 29, 1968, as part of its assistance to the committee, all registered less than 0.1 ppm.

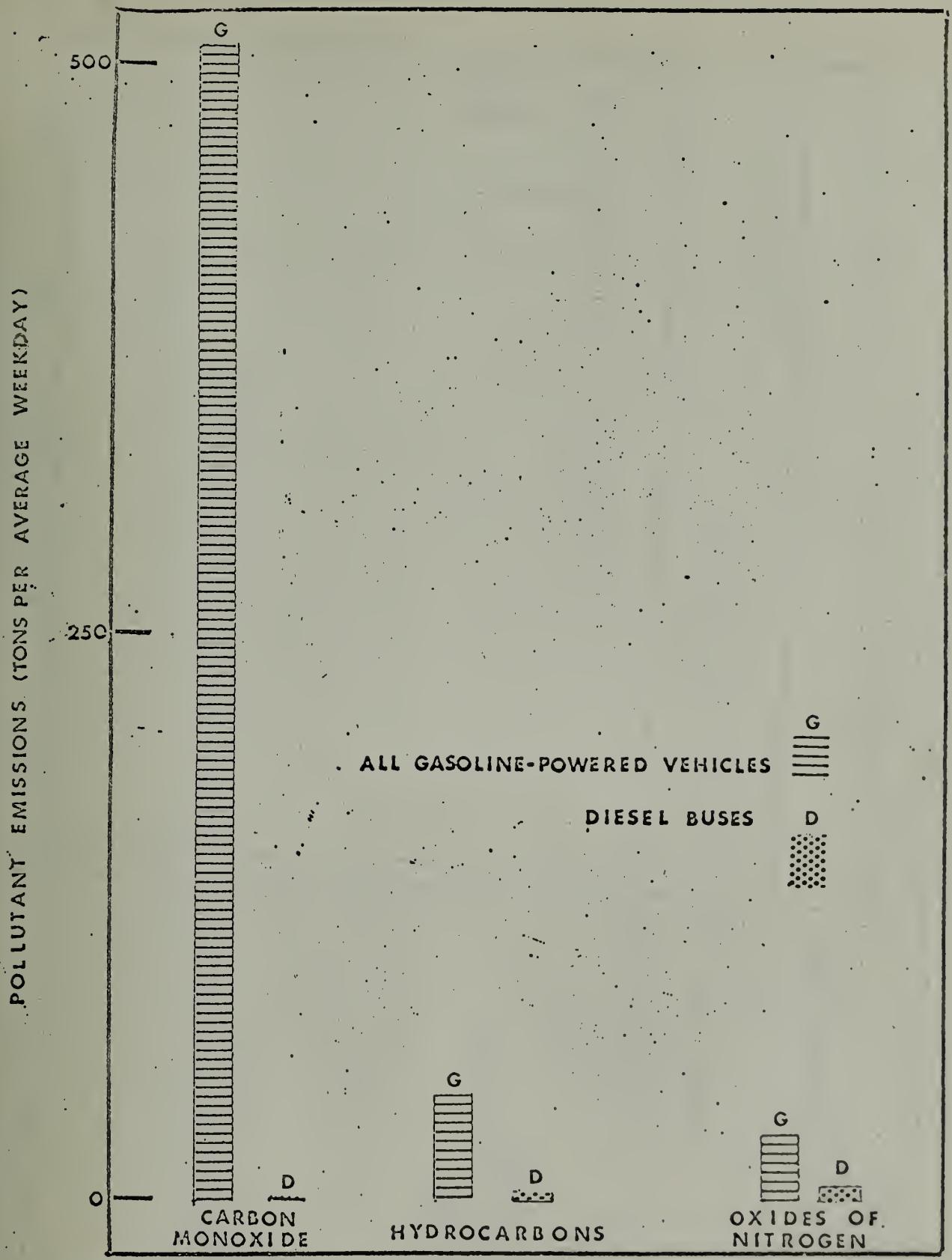
Nitrogen dioxide concentrations obtained from other (manual) samples taken in Seattle are as follows:

1962	0.013 - 0.075 ppm
1963	0.03 - 0.07 "
1964	0.01 - 0.06 "
1965	0.035 - 0.045 "

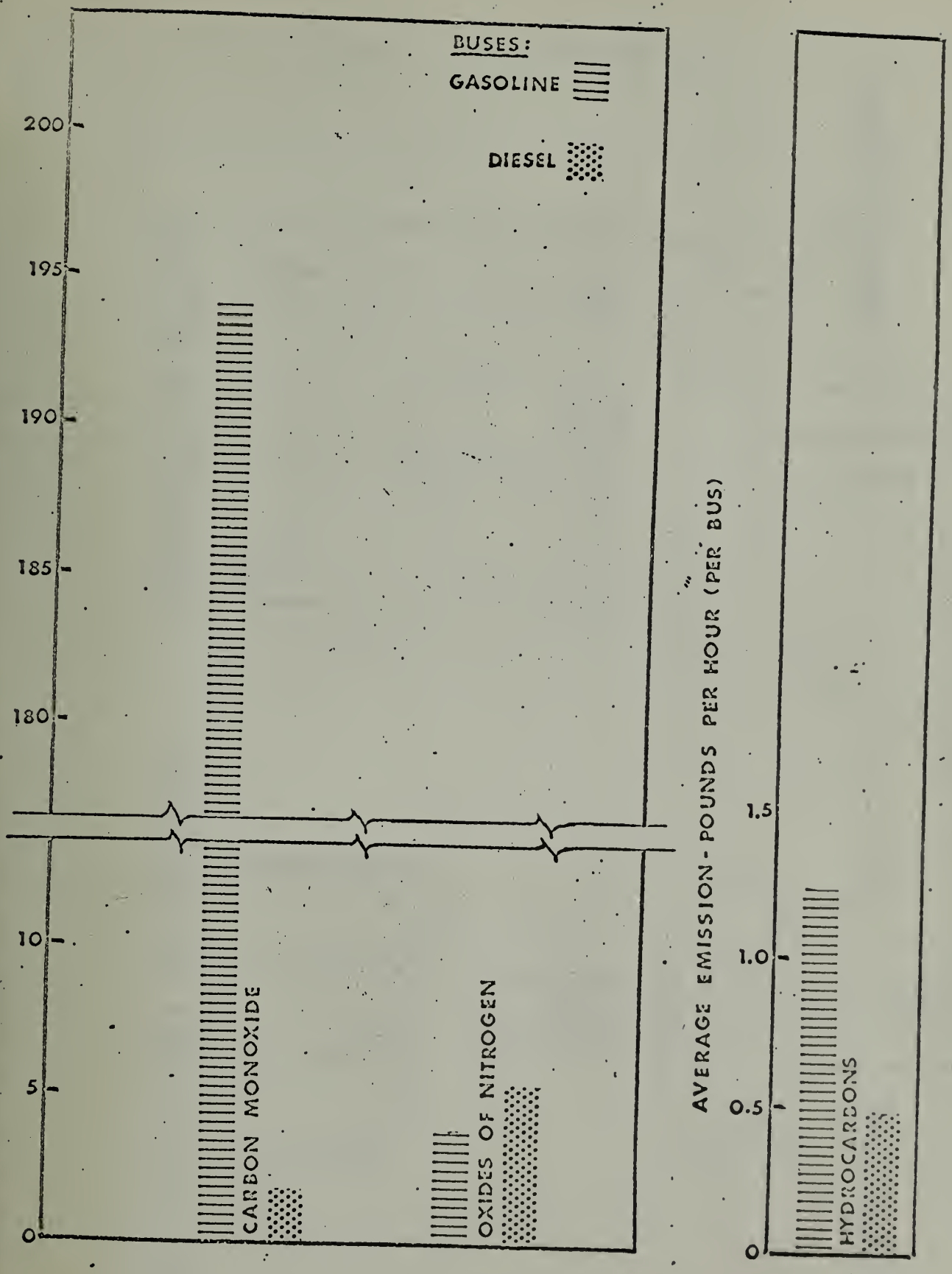
The peak NO_2 values, from a continuous recording instrument at the Seattle Center for May, June, and July, 1968, are as follows:

May	0.02 - 0.15
June	0.02 - 0.12
July	0.04 - 0.13

It is to be noted that the State of California standards sets the "adverse" and "serious" levels for NO_2 at 0.25 ppm and 3 ppm for one (1) hour, respectively. Only the 3 ppm limit has application to health effects, since the lower limit of 0.25 was established to prevent visibility effects in the atmosphere.



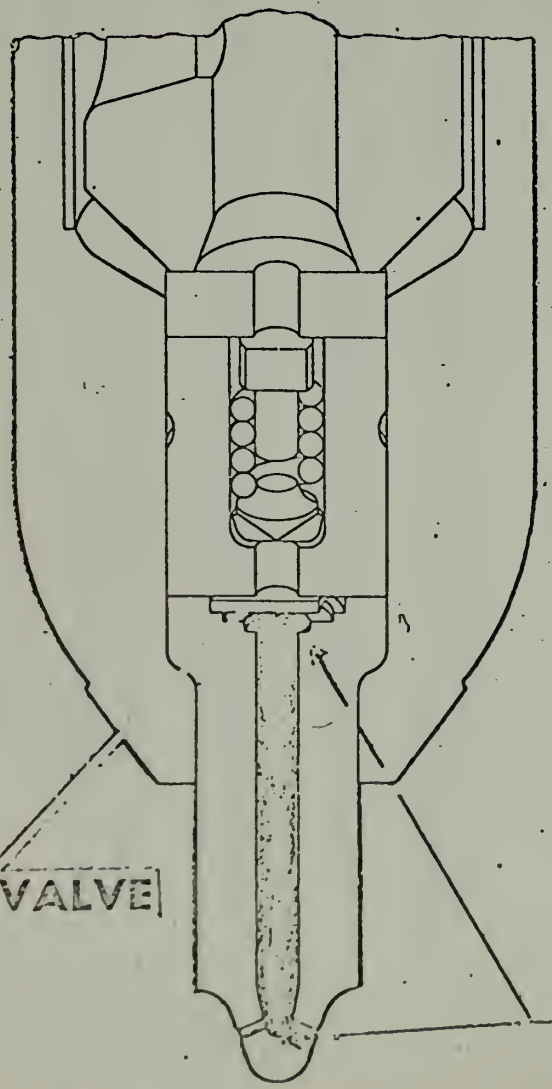
AIR POLLUTION FROM AUTOMOBILES AND DIESEL BUS EXHAUST IN SEATTLE[1]



EMISSIONS OF GASOLINE AND DIESEL BUSES—CITY OPERATION

DATA[21]

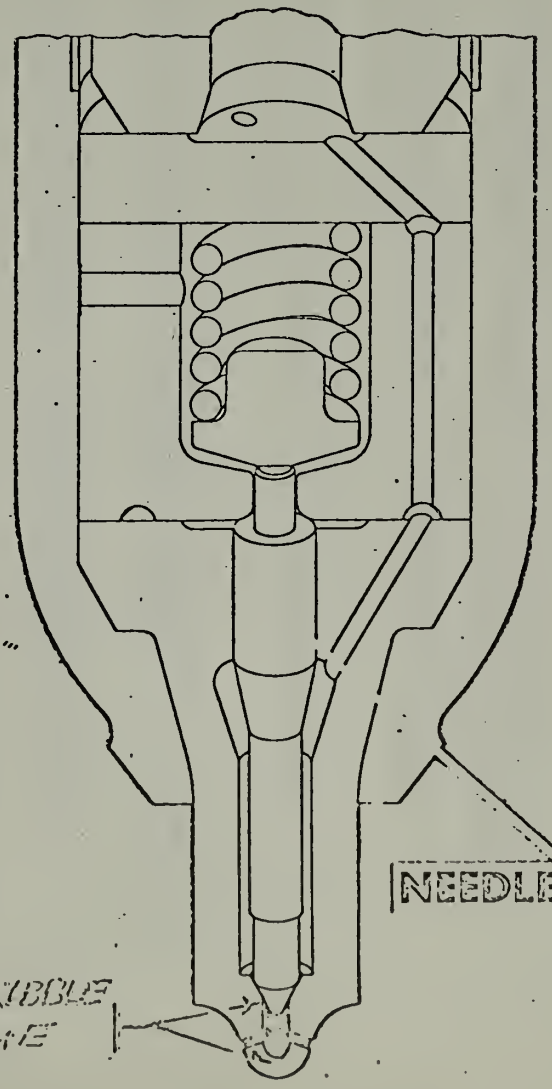
STANDARD INJECTOR



TYPICAL SERIES "S"

REDUCED NIBBLE FUEL VOLUME

NEEDLE VALVE



TYPICAL SERIES "N"

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TRUTH ABOUT TRANSIT

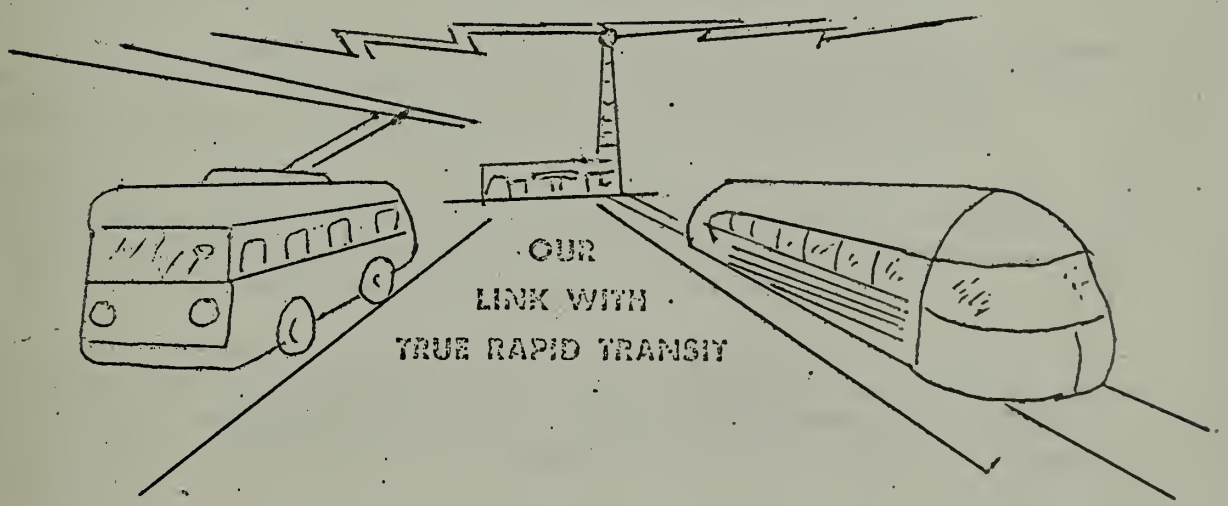
TRUTH ABOUT TRANSIT

CHARTER AMENDMENT

ARTICLE XXIV

AND

THE TRUTH ABOUT TRANSIT



AN ENGINEERING APPROACH TO
THE ELECTRIC-DIESEL CONTROVERSY

COMET / *Committee for Modernization of Electric Transportation*

Ours is a Hydro-Electric Economy . . . Let's Use It!

INTRODUCTION

We urge you to read this pamphlet from cover to cover. It contains information which will come as a complete surprise to many of you who believe implicity in the commission form of management. It will come as an even greater surprise to those of you who have accepted Seattle Transit's Dieselization program because of such cliches as 'flexibility, adaptability, express freeway service, cost-per-coach mile, availability, etc.; none of which have anything to do with either service to the patron or sound transit management.

Ours is not an emotional argument. We have devoted a year and a half to an exhaustive study, in an attempt to get at the true 'facts'. We have found answers to most of our questions with one notable exception; the true reason for Transit's dieselization of a solvent transit system built entirely by the efficient trolley coach. In view of the information contained herein, the motives behind this move are obscure and beyond comprehension.

We would appreciate anyone's sincere efforts to check our findings. We know that those who do this, will regardless of previous convictions, vote "YES" for our proposed Charter Amendment Article 24, in the March election.

At the end of this pamphlet is a bibliography listing the sources of our information. We of "Comet" do not want you to accept this information blindly or to take our word that it has all been documented. We suggest instead, that you refer to the material listed and satisfy your own doubts, if any.

It should be of particular interest to the reader to note that most of this bibliography consists of reference material from Seattle Transit System records. This is significant because it means that Transit management apparently has never referred to its own records for guidance in the selection of equipment for fleet replacement.

Therefore, Transit either does not know what it is doing, or is fully aware of how rapidly a predominately diesel fleet will bankrupt the system and is promoting the program in spite of this knowledge.

We are all aware that the Seattle Transit System has enlisted the aid of several influential metrolopitan area organizations. They are also spending thousands of their patrons' dollars and bombarding the public with a concentrated, incessant advertising campaign to drown out our voice.

Unlike Transit, we do not have unlimited fare box funds and were not able to print this pamphlet in large numbers. We urge you not to destroy it, but to read it to individuals and groups or pass it on. This is the only way in which both sides will be heard and an informed vote cast on this issue in the March election.

Respectfully submitted,
February, 1964

COMET

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Trolley Net Profit	+	$31,753,576.33
Motor Net Loss	-	21,419,289.48
System Net Profit		$10,334,286.85

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ERRATA: Page 15, 3rd paragraph ... for, "By 1948", read "Through 1948"
Page 20, Daily Journal News Item Caption - for, "since the late 20's", read, "since the late 30's"

"NEW ARTICLE XXIV

MANDATE TO ASSURE MODERN ELECTRIC POWERED PUBLIC TRANSPORTATION SYSTEM

Sec. 1. In the interest of public health and safety, economy, cleanliness of the atmosphere, peace and quietude, the voters of the City of Seattle hereby direct that the public transportation system of the City shall consist of and utilize a predominance of electrically powered vehicles and/or conveyances for carrying of patrons. The electric power to operate such vehicles and/or conveyances shall be purchased from the City of Seattle lighting department.

Sec. 2. All electric coach lines in the City in operation as of June 3, 1963, shall be restored to full operation within one calendar year after the approval by the voters of this amendment. This section shall not be construed to restrict the rerouting of portions of electric lines necessitated by construction projects, traffic pattern changes, or disasters.

Sec. 3. It shall be the duty of Transit Management to utilize existing electrically powered equipment insofar as possible, and to acquire additional electrically powered equipment to make the system comply with Sec. 1.

Sec. 4. It shall further be the duty of Transit Management to work toward expansion and modernization of the electric transportation system."

QUALIFICATIONS AND AFFILIATIONS OF CORPORATION OFFICERS

President: STANLEY A. SANDSTROM, Heating Contractor; Former Lieutenant, Seattle Fire Department (18 years service);
Member: Knight of Columbus, American Legion, Forty & Eight, Secretary-Treasurer of Broadway Reunion Committee.

Vice Pres: B. RICHARD DAWSON, Professional Consulting Electrical Engineer;
Member: American Institute of Electrical Engineers, Washington State Professional Engineers Society.

Secy-Treas: E. E. VAN NESS, Professional Elec. Engr.; Chief Electrical Engineer for Tracey Brunstrom & Dudley Consulting Engineers.
Senior Member: Society of Technical Writers and Publishers.
Member: Washington Society of Professional Engineers; Past Member: Illuminating Engineering Society; Past Associate Member: American Institute of Electrical Engineers.

Director: JOHN L. STARCEVICH, Assistant Business Manager, Local 77 IBEW (Oregon, Washington, N. California, N. Idaho and W. Montana)
Former Employee: City Light (7½ years); Seattle Transit System (5 years); Member: Local 77, IBEW.

Director: LLOYD A. ANDERSON: Manager of Recreational Equipment, Inc.
Professional Civil Engineer, State of Washington; Former Engineer, in charge of Feeder Distribution and Substation Modernization (30 years Transit service, early retirement)
Member: The Mountaineers.

ARTICLE XXIV - A MUCH NEEDED CHARTER AMENDMENT

The Seattle Transit System sells rides to people just as the Lighting and Water Departments sell watts and water. All three are publicly owned and are obligated to produce what they sell in the least expensive manner in order to give the people the best possible service at the lowest possible cost while remaining financially sound.

Let us assume that City Light, having unlimited powers, decided to do away with all sources of hydro-electric generation and convert to a system of diesel generator plants. Let us also assume that the Water Department, having similar autocratic powers, decided to utilize, instead of gravity, a network of diesel pumping stations to bring water over great distances and to all parts of the city.

These assumptions appear ridiculous except in the light of the absolute, Charter-granted powers of our Transit Commission. If City Light and the Water Department had similar powers and could take such steps, a Charter Amendment, such as Article 24, would be a necessary action to prevent such poor decisions from becoming realities.

By no stretch of the imagination could this be termed "meddling in management"!

Bear in mind, that in this analogy, all that these city departments did was to decide on a change in the type of prime mover to obtain the power to produce what they sell.

This is precisely what the Seattle Transit management is attempting to do!

Of all City departments, only Transit has unrestricted powers. They could junk all their coaches and replace them with rickshaws, buggies or any type of vehicle. They could also stack their new diesels and burn them. No one could stop them, just as "Comet" was unable to stop them from junking 104 good trolleys which were by Transit's own admission, as good in 1957 as when they were first purchased. Also, by their own admission, the replacement value of the trolleys so destroyed was $35,000 each or $3,640,000 of our money. Even if the diesels <u>were</u> cheaper to operate than the trolleys, this was not good business.

Article 24 no more "meddles with management" than "Thou Shalt Not Steal" meddles with the rights of the individual. The individual has no more right to steal than Transit management has to bankrupt our Transit System.

It is our only recourse since <u>we cannot vote such management out of office</u>!!

THE ALL-POWERFUL TRANSIT COMMISSION

The present five man Transit Commission was established in 1952 by the voters as a means of keeping the city's public transportation system "out of politics". The intent was to safeguard an efficient electric trolley system augmented by a smaller fleet of motor buses. It is doubtful that these voters realized that they were jeopardizing their investment by relinquishing all direct controls over their transit system and over the men who were to manage it.

What the people had overlooked, was that a commission form of government is based on the premise that the people do not know what is good for them and they also forgot that the most powerful totalitarian governments were built on arguments of keeping first one thing and then another "out of politics".

It is hard to understand how our Transit Commission was intended to provide for competent management. Consider the following naive provisions of the existing Charter for assuring a well-managed system.

1 - The mayor appoints the commissioners and his appointments are approved by the City Council. Regardless of background, each commissioner then becomes an "instant transit expert".

2 - These commissioners have the power to appoint and remove at will a General Manager, who as an advisory expert, teaches them all they will ever know about transit management.

3 - The commission thereby becomes the transit expert group whose duty is to advise their own advisor and teacher and approve or disapprove his decisions.

The present Charter through Article 23, gives this group absolute and autocratic powers with only two restrictions. They must utilize the city's legal department and the city's purchasing department. Although these restrictions are mandatory, they even chose to ignore the latter until January 3, 1963 when "Comet", through a court action, forced them to utilize the City Purchasing department and advertise for bids on the new diesels.

Since 1952, it is difficult to justify the Commission's reason for existence. They act as a buffer between the General Manager and the public and they lend an air of respectability and authority to the mistakes of management. Through their connections with the Central Association and the Chamber of Commerce, they can marshal influential forces for immediate, unanimous support of unwise decisions.

THE COST PER COACH MILE - A GRIM FAIRY TALE

The cost-per-coach-mile comparison which has destroyed many financially sound transit systems in America, is nothing more than a gimmick! No other term describes it more factually. To dignify it with a word such as "formula", is to mislead the uninformed public into believing that it is a valid and reliable tool for determining the economic value of one type of transit coach over another.

The question, "Why have American transit systems subscribed to its use?" has no simple answer. This is as hard to explain as the reasons why a group of public servants, such as the Transit Commission and their General Manager, have joined forces with private business men of the Central Association and the Chamber of Commerce and launched a propaganda campaign aimed at depriving the people of a publicly owned, efficient, electric transportation system.

This cost-per-mile gimmick is used only by transit systems! Railroads and trucking companies use either the cost-per-passenger or the cost-per-ton-mile because they have to know what to charge and which equipment is the most economical for the work it does. Unlike public transit systems they are not dealing with a captive audience and must know the true answers in order to stay in business.

For over thirty years so-called 'engineering' firms, acting as consultants, have used the cost-per-mile as the basis of their recommendations in millions of dollars worth of surveys. Through its use, city after city has been persuaded to scuttle already paid for electric fleets in favor of the costly purchase of motor busses.

The W. C. Gilman & Company Report, which is being used as the blueprint for the destruction of our electric trolley and substation facilities, uses this cost-per-coach-mile as its major premise. The fact that this firm is noted for its pro-motor bus surveys did not prevent it from being hired to produce an unbiased report.

It is alarming to note that Transit management engaged the W. C. Gilman & Company with no apparent concern of a possible conflict of interest in spite of the fact that W. C. Gilman, before his death in 1963, was the Vice-President and Director of Coronado Petroleum Corporation and President and Director of International Oil Pipeline Company.

Seattle Transit's present Research Director is according to the P.I. of December 17, 1959, "one of the outstanding experts on transit, recently having made a survey for St. Louis at a salary almost double of what he is now getting." This man was the managing director of the St. Louis survey, completed in 1959 by W. C. Gilman & Company, which recommended nearly 42 miles of elevated city roadways to be used only by transit motor busses. The cost of over 4 million dollars a mile, a total of 175 million dollars, was to be paid for by an annual county "use tax" of 20 dollars per passenger automobile.

This same man now forecasts 'bankruptcy and financial chaos' at the thought of a mere 750 thousand dollars of Transit's own available funds for 30 miles of overhead lines for the exclusive use of the trolley coach.

Although the cost-per-mile comparison has been challenged before, it has only been from a naive, "I wonder why we use it?" type of approach. In 1954, a Charles Guernsey presented a paper before a meeting of the American Transit Association in New York, titled "Present Accounting Methods Do Not Give True Answers". He was on the right track but he did not go far enough.

He failed to come out and ask: "What good is it to know the cost-per-mile if you do not know how much revenue the coach earned or how much work it did, in stop-and-go operation, to earn it?"

During the dieselization attempt by a Transit Commissioner in 1959, Seattle Transit's General Manager was noted by the Seattle Times of December 17, 1959 as "pointing out that the trolleys are used on hilly runs, where speed is reduced and operating costs consequently are higher". A few days later, in the December 23, 1959 issue, the Times again noted "that the General Manager of the Transit System has pointed out that the cost comparisons between the two types of equipment may be faulty because the trolleys are used on the steepest routes, whereas diesel-powered busses generally are assigned to more nearly level lines." These statements prove that the General Manager of the Transit System is fully aware that the cost-per-mile does not consider the work done in earning money.

In addition, this gimmick ignores the fact that increased work or reduced mileage of a coach fleet will raise its cost-per-mile. Such fluctuations of the cost-per-mile have nothing to do with the revenue earned and have no value except to hide the miserable performance of the gas or diesel bus.

To say that the diesel is better than the trolley because it has a lower cost-per-mile is like saying that a car used only for cross-country driving is better than any car used exclusively in the downtown area because the car used on long trips gets many more miles per gallon, at a lesser cost-per-mile.

Through the use of the cost-per-mile, Transit can 'prove' anything they want to. They can 'prove' that the best vehicle in the fleet is the worst, by letting it sit in the garage while the trolley overhead track is still being maintained and charged against it. At zero mileage, for this particular coach, the cost-per-mile would be infinitely high.

On the other hand, they can take their most broken down, inefficient diesel bus and run it millions of miles per year with its doors locked, and its cost-per-mile will be so low as to be negligible.

In the two cases mentioned above, neither vehicle will have earned any money for the system, but the trolley in the garage, in spite of a terrifically high cost-per-mile, will have lost less than the broken down diesel with the lowest possible cost-per-mile.

PROFIT AND LOSS - THE FAREBOX STORY

The Seattle Transit System, since 1939, has remained one of the few financially sound systems in the United States....for only one reason: A PREDOMINANCE OF EFFICIENT AND DURABLE ELECTRIC TROLLEY COACHES.

For over 23 years, the amazingly economical trolley coach has made up for the high farebox revenue losses of the motor bus fleets. It has earned profits far above its own expenses and has:

1 - Paid 9 million dollars for a total of 650 motor busses, 342 of which have been junked.

2 - Paid off a 10 million 800 thousand dollar Reconstruction Finance Corporation loan in a period of 10 years.

3 - Paid our City Light nearly 8 million dollars for electricity, thereby boosting our city economy.

4 - Maintained a healthy Betterment fund as a direct result of its farebox profits. This fund, now reduced to 2.5 million dollars by the last diesel purchase, cannot be rebuilt without a predominance of electric operation.

5 - Paid for its own maintenance, while carrying twice the passenger tonnage on the steep hill routes. Such hard work would have resulted in an immediate deterioration of any gas or diesel fleet.

6 - Made Transit management look very, very good in spite of their poor judgement.

In the face of this record, Transit management's spokesmen, influential business men, organizations and certain of the news media are busily bombarding the taxpayers with the ridiculous claim that a return to a proven electric operation would bankrupt the system.

In 1955, E. L. Tennyson, Traction Commissioner of Youngstown, Ohio, made the following statement:

> "On busy routes, busses have failed as a suitable transit vehicle. Losses of both riding and revenue are the long range result. Their advertised 'flexibility' is offset by being 'mousetrapped' in traffic, as well as their unpleasant riding qualities."

Transit's threats of 'bankruptcy and subsidies' will surely come true <u>if Article 24 fails</u> in the March election.

Apparently Transit management has never bothered to study its own financial reports. What these books reveal is not a matter of emotionalism, propaganda or confusion but a MATTER OF RECORD.

Even a casual glance by the reader at the following information as recorded in the <u>State Audited, Seattle Transit System Annual Reports</u>, will reveal that the motor bus is a dismal failure as a public conveyance. It will also raise a question regarding Transit's analytical ability especially in matters of vehicle replacement.

The Annual Net Farebox Profits and Losses shown graphically in Figure 1, are based entirely on Seattle Transit System records and their State Audited Monthly and Annual Financial Reports.

Despite Transit management's arguments to the contrary, these farebox profit and loss records are the only valid criteria for determining a vehicle's value to our transit system. These records are concerned only with the basic factors which determine the success or failure of any business; total basic revenue produced minus total expense. Such net farebox earnings or losses, directly affect the solvency of the Seattle Transit System and are indirectly responsible for any other non-operating revenues.

From 1939 through 1948, the Seattle Transit System maintained separate Farebox Revenue records for their electric and their motor bus operations. A comparison of the earnings and losses during this period alone, reveals that the trolley coach fleet earned a net farebox profit of 15.9 million dollars above its total operating, maintenance and administrative expenses while the total motor bus expenses exceeded their total earnings by 3.8 million dollars.

The actual State Audited annual amounts of these net earnings and losses and the resulting net farebox profit of the system, are as follows:

YEAR	TROLLEY PROFIT	MOTOR PROFIT OR LOSS
1940	$ 319,402.41	134,512.26
1941	962,017.20	299,323.65
1942	1,982,166.35	22,646.31
1943	2,600,843.39	27,532.03
1944	3,069,772.20	181,360.78
1945	2,868,923.67	385,000.41
1946	1,685,255.34	761,495.03
1947	1,338,993.53	956,758.56
1948	1,077,551.72	1,137,467.94
T. PROFIT	$15,904,925.81	M. LOSS $3,855,918.63
		M. PROFIT 50,178.34
		M.NET LOSS $3,805,740.29

TROLLEY NET PROFIT	$15,904,925.81
MOTOR NET LOSS	3,805,740.29
SYSTEM NET PROFIT	$12,099,185.52

This 9 year period was the most crucial in the history of the Seattle Transit System and offered Transit management a golden opportunity to study and profit by all possible conditions and problems in the operation of an urban transit system. However, they apparently ignored the lessons to be learned and since even their highly touted cost-per-mile gimmick strongly favored the trolley throughout this period, it is hard to justify their actions.

During the war, all equipment was subjected to maximum work-load conditions, with unlimited revenue earning potential for both motor bus and trolley coach. These conditions conclusively proved the superiority of the trolley coach in both efficiency and durability.

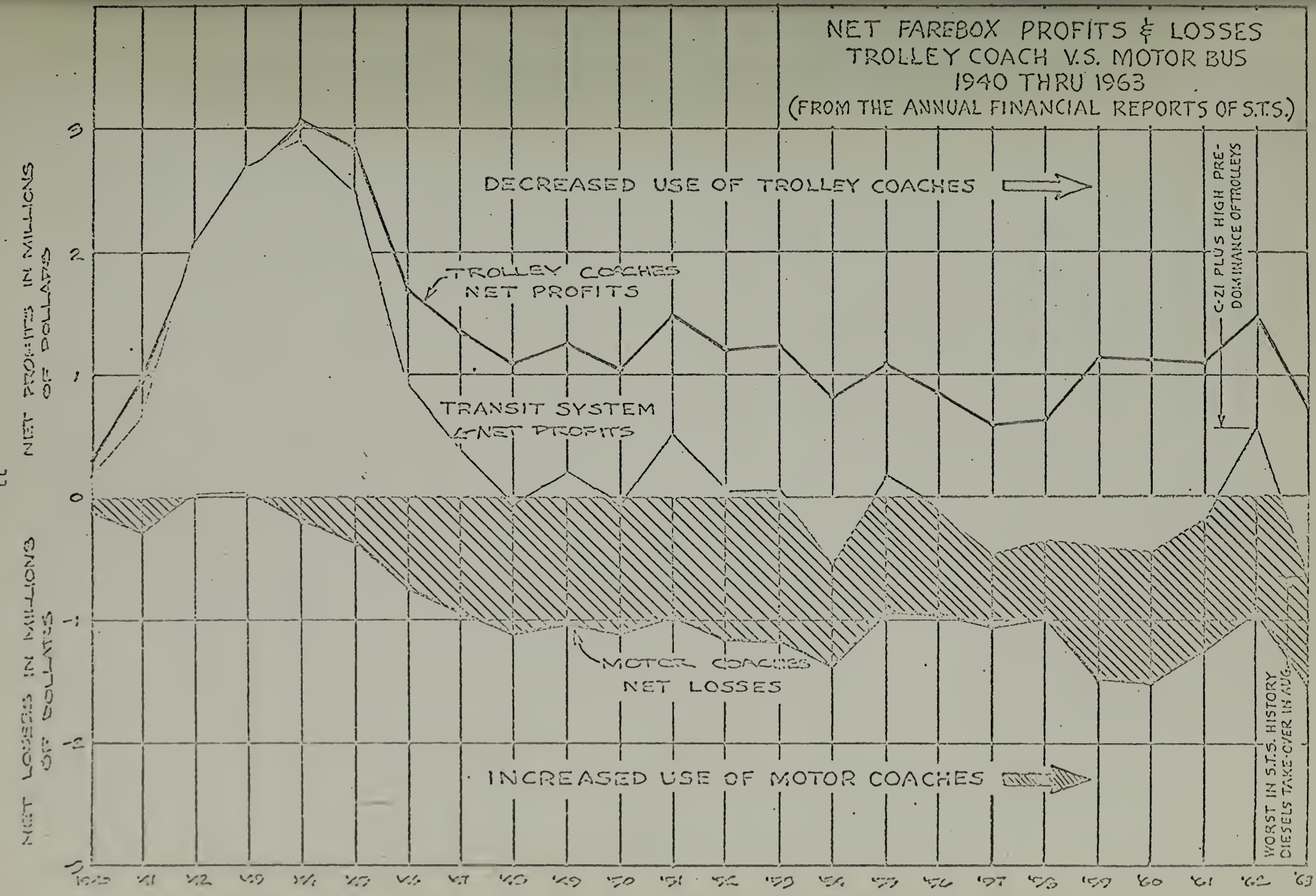
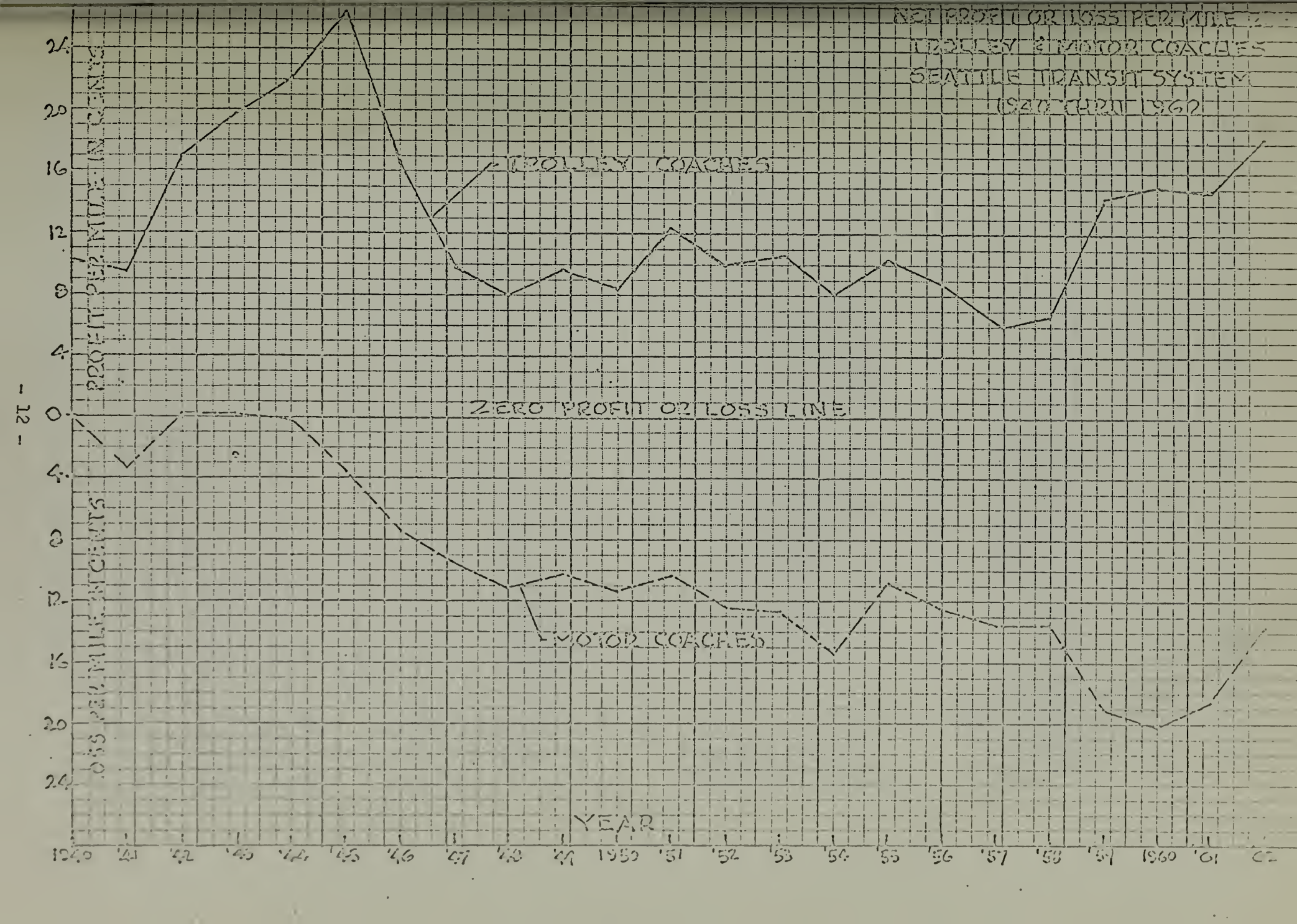

NET FAREBOX PROFITS & LOSSES
TROLLEY COACH V.S. MOTOR BUS
1940 THRU 1963
(FROM THE ANNUAL FINANCIAL REPORTS OF S.T.S.)
NET PROFITS IN MILLIONS OF DOLLARS
NET LOSSES IN MILLIONS OF DOLLARS
DECREASED USE OF TROLLEY COACHES
TROLLEY COACHES NET PROFITS
TRANSIT SYSTEM NET PROFITS
C-ZI PLUS HIGH PRE-DOMINANCE OF TROLLEYS
MOTOR COACHES NET LOSSES
INCREASED USE OF MOTOR COACHES
WORST IN S.T.S. HISTORY DIESELS TAKE-OVER IN AUG.
3
2
1
0
1
2
'40
'41
'42
'43
'44
'45
'46
'47
'48
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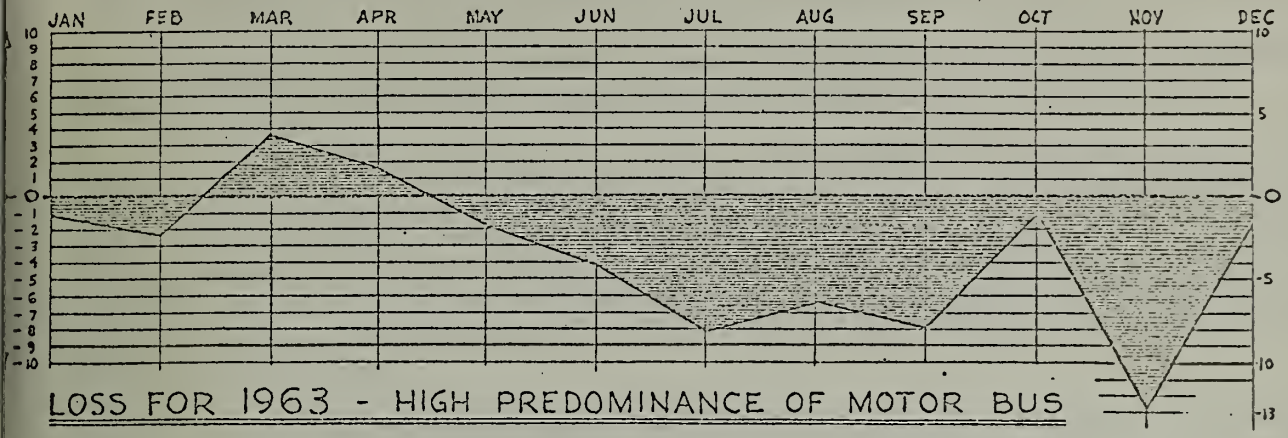
Fig. 1

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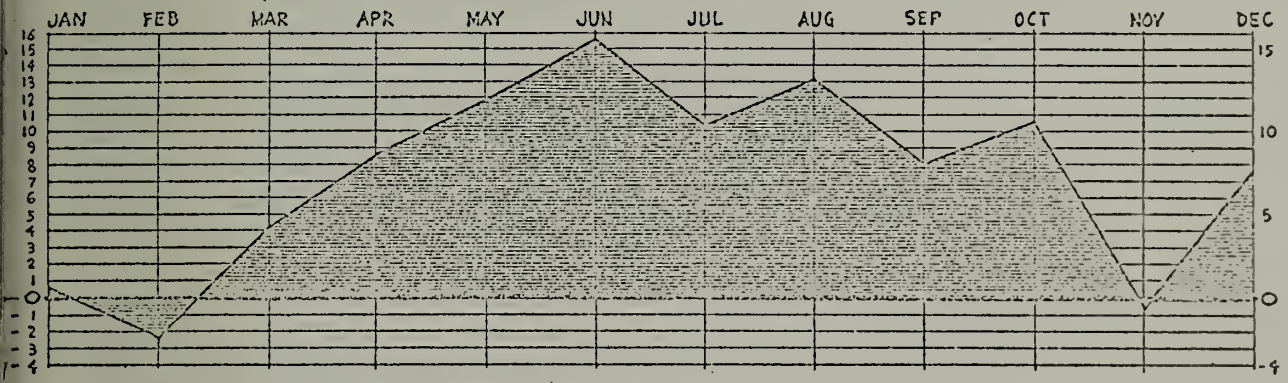

NET PROFIT OR LOSS PER MILE OF TROLLEY & MOTOR COACHES SEATTLE TRANSIT SYSTEM (SATCHRT 1962)
TROLLEY COACHES
ZERO PROFIT OR LOSS LINE
MOTOR COACHES
NET PROFIT OR LOSS PER MILE IN CENTS
YEAR
24
20
16
12
8
4
0
4
8
12
16
20
24
1940
'41
'42
'43
'44
'45
'46
'47
'48
'49
1950
'51
'52
'53
'54
'55
'56
'57
'58
'59
1960
'61
'62

NET OPERATING MONTHLY PROFIT & LOSS FOR THE LAST 4 YRS.

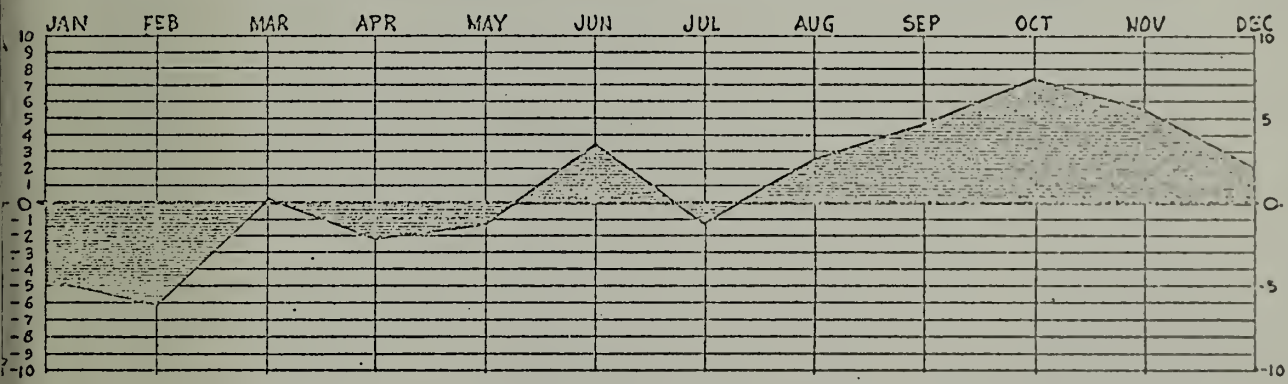
FROM PAGE Nº 4 OF SEATTLE TRANSIT SYSTEM'S MONTHLY FINANCIAL REPORTS



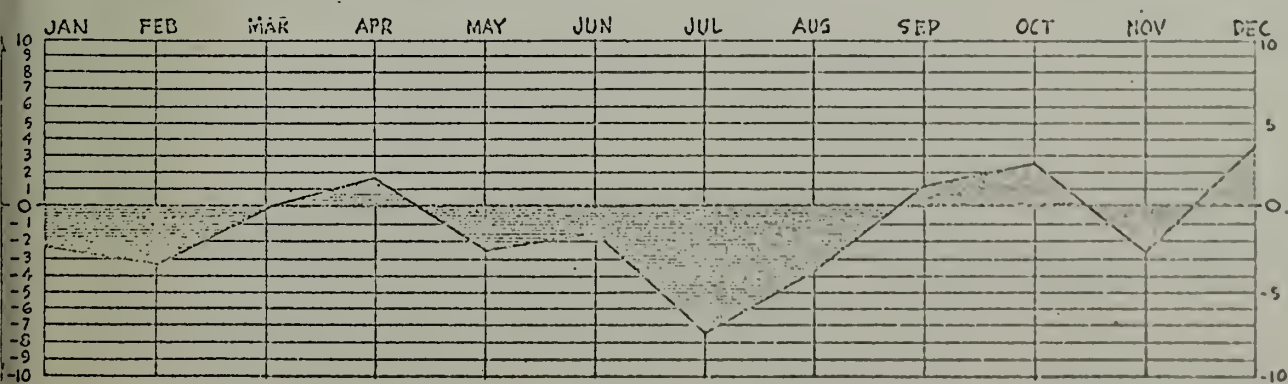
LOSS FOR 1963 - HIGH PREDOMINANCE OF MOTOR BUS



PROFIT FOR 1962 - HIGH PREDOMINANCE OF TROLLEY COACH



PROFIT FOR 1961 - PREDOMINANCE OF TROLLEY COACH



LOSS FOR 1960 - PREDOMINANCE OF MOTOR BUS

Fig. 4

When the junking program started in 1962 all but 2 of the original 307 trolley coaches were still in service. At present, 69 are slated for junking, and 132 are assigned to the curtailed trolley operation in the central hill area.

Of the original 239 motor busses in 1940, 181 had been junked and replaced by 1948; this new fleet of 254 busses had an average age of 3½ years.

In 1945, W. C. Gilman & Company prepared their annual engineering report and ignoring the miserable war record of the motor busses, made several recommendations. One, was that "express service might be better provided by motor busses along present trolley bus routes," because of the 'inflexibility' of the trolley. By 1948, annual operation had been reduced by 765,953 miles from the 1945 peak and the trolley had absorbed 76% of this due to increased use of motor busses under trolley wires.

In spite of reduced mileage and a resulting reduction in earnings, the trolley continued to make a net farebox profit of over a million dollars per year while motor bus losses increased by hundreds of thousands of dollars as shown on Page 10.

Transit management's solution for these increased losses and reduced profits was to increase its fare on June 22, 1947 from an 8 1/3 cent token to ten cents, purchase 100 new Twin gas busses and increase motor bus mileage. The year 1948 was the first during which trolley net profits could not offset motor bus losses which had for the first time, exceeded one million dollars.

During the period from 1948 through 1959, Seattle Transit did not maintain separate farebox records, but known revenue productivity of 1948 and the percentage provided by a "load point" traffic check of 1959 allows us to interpolate and develop the following.

YEAR	TROLLEY PROFIT		MOTOR LOSS
1949	$ 1,260,218.71		$ 1,040,235.36
1950	1,041,052.59		1,111,619.69
1951	1,484,941.73		985,994.00
1952	1,205,279.22		1,189,308.93
1953	1,225,486.71		1,187,489.69
1954	825,057.22		1,408,094.42
1955	1,089,982.36		933,775.24
1956	877,624.19		973,521.37
1957	616,577.43		1,065,878.67
1958	630,659.82		985,843.95
1959	1,128,633.30		1,499,550.02
T. PROFIT	$11,385,513.28	M. LOSS	$12,381,311.34

MOTOR NET LOSS	$12,381,311.34
TROLLEY NET PROFIT	11,385,513.28
SYSTEM NET LOSS	$ 995,798.06

During these eleven years, the Seattle Transit had reduced our service by nearly 8 million miles and the trolley operation had absorbed 71% of this cut-back. Once again, with more diesel busses under trolley wires, Transit Management had conclusive proof that motor busses cannot operate under heavy stop-and-go "trolley route conditions" without incurring excessive losses.

The "take-over", however, was continued in earnest and reached a climax in 1959 with the first, concentrated attempt by Transit Management to dieselize our transit system.

This dieselization was attempted with full knowledge of a 16 year, comparative trolley - diesel record. From 1940, GMC diesel busses competed, under heavily loaded conditions, with Brill trolleys of the same age: the trolleys on the hill-routes and the diesels on the more level runs. Within 5 years, the direct expense of the diesel was over $1 thousand more per bus than the trolley at equal mileage. By December 1955, they had vibrated themselves into scrap, while the trolley continued to further the solvency of the Seattle Transit System.

In spite of this diesel failure, Transit management in 1954, purchased 15 test busses for $320 thousand and in 1955, spent $2.2 million on 100 new GMC diesel busses. It is interesting to note that the fare was increased six times in this period; from ten cents in 1947 to a straight twenty cents, plus a five cent zone fare, in 1957.

With the 100 new minimum-maintenance, diesel busses and the advent of our State Fuel Tax Subsidy in June of 1957, the cost-per-mile for the first time favored the motor bus fleet. In 1959, carefully developed comparisons between the newest diesels and the 20 year old trolleys, loaded with rehabilitation costs, 'proved conclusively' that the trolley had to go. A disagreement among members of Transit's management, temporarily saved our electric transportation system.

The next four years, which bring us to the present, show both the benefits of increased electric operation and the exorbitant losses resulting from a 5 month partial dieselization of our trolley lines. These net farebox profits and losses are developed by extrapolation from the preceding years and from known adjusted route earnings.

YEAR	TROLLEY PROFIT		MOTOR LOSS
1960	$1,123,520.07		$1,537,364.49
1961	1,103,579.64		1,289,353.94
1962	1,465,030.07		944,803.96
1963	771,007.46		1,460,715.46
T. PROFIT	$4,463,137.24	M. LOSS	$5,232,237.85

MOTOR NET LOSS	$5,232,237.85
TROLLEY NET PROFIT	4,463,137.24
SYSTEM NET LOSS	$ 769,100.61

The graphs, on page 14, show the basic farebox profits and losses for the above 4 years combined with other operating incomes. These other incomes have been excluded from the above studies because they tend to cloud the basic revenue productivity of the vehicle.

The following is a summary of the above 24 years in terms of farebox net profit or loss. In view of this, is Article 24 meddling in management?

SYSTEM SOLVENCY - 1940 THROUGH 1963:

TROLLEY NET FAREBOX PROFIT	$31,753,576.33
MOTOR NET FAREBOX LOSS	21,419,289.48
SYSTEM NET FAREBOX PROFIT	$10,334,286.85

Only Transit management can tell the people of Seattle how much the above motor bus net farebox losses have meant in reduced service, increased fares and patronage losses.

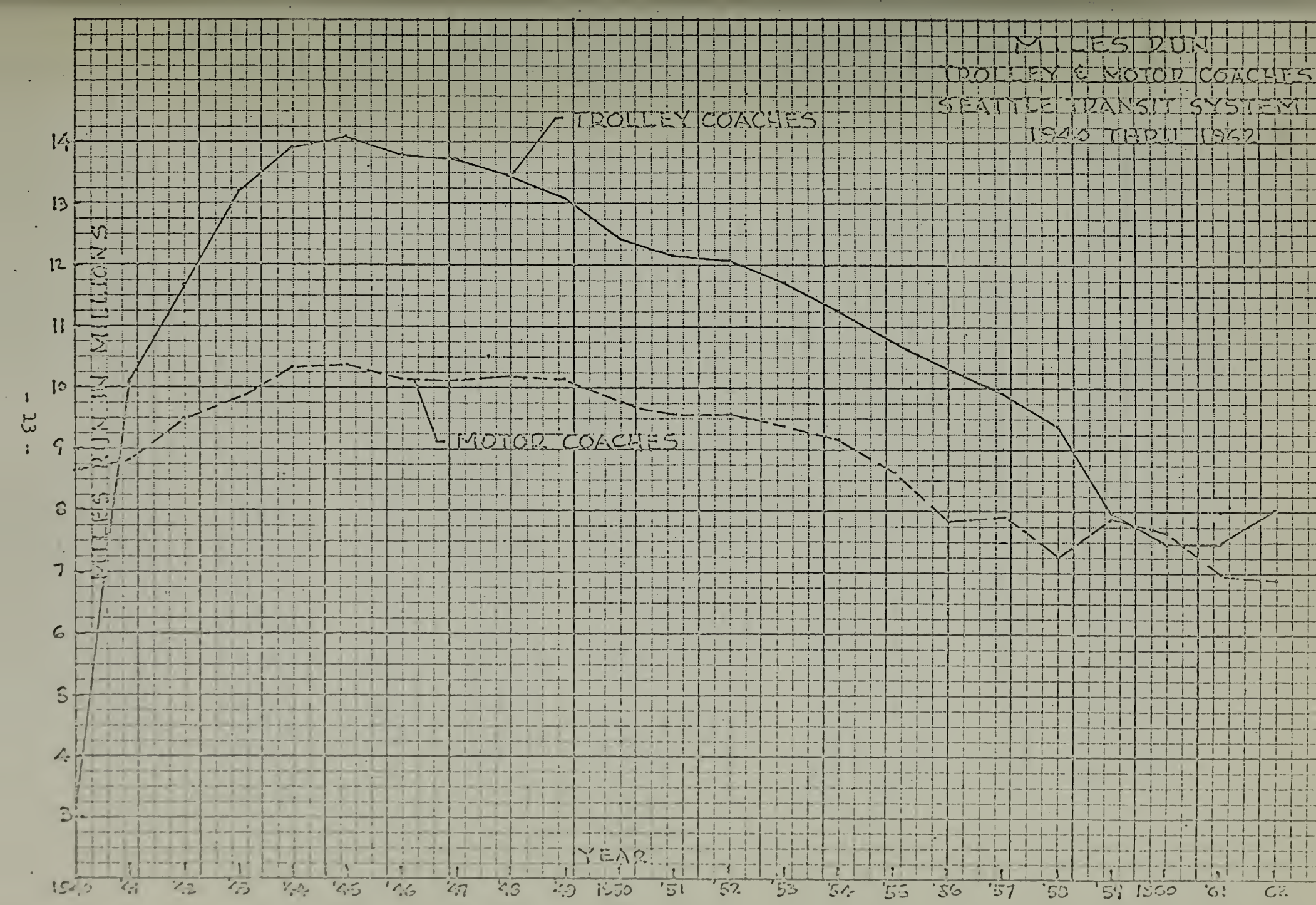

MILES RUN
TROLLEY & MOTOR COACHES
SEATTLE TRANSIT SYSTEM
1940 THRU 1962
TROLLEY COACHES
MOTOR COACHES
MILLIONS OF MILES RUN
YEAR
14
13
12
11
10
9
8
7
6
5
4
3
1940
'41
'42
'43
'44
'45
'46
'47
'48
'49
1950
'51
'52
'53
'54
'55
'56
'57
'58
'59
1960
'61
'62

Fig. 3

NATIONAL TRANSIT POLITICS

To most readers, "National City Lines" means nothing, but in the transit industry they are well known, having been co-defendents with General Motors Corporation, Standard Oil of California and others in Federal anti-trust action and found guilty on several counts in 1949. They were involved again with GMC and others in 1956 but this action was adjourned indefinitely in 1958.

Count #5 in this latest action is rather interesting, to wit: "...Inducing officials of municipally owned Transit companies to issue restrictive bus specifications excluding other manufacturers' from bidding."

The history of National City Lines has, in the past, been one of acquiring transit properties in city after city and replacing electric vehicles with the motor bus. Frequently they financed their initial bus purchases through Yellow Manufacturing Acceptance Corporation, a wholly owned subsidiary of GMC. Then, after a system had gone bankrupt, they would move on as in the case of Great Falls, Montana, Everett and Bellingham, Washington, and many other cities, taking the farebox revenue with them, and leaving behind a virtually worthless fleet of busses much in need of repair.

With the advent of the Metro plan, NCL has changed its modus operandi slightly, reluctantly agreeing that "while private ownership is preferable, private management under contract to public ownership can work for the good of all..." Then as private manager, with their fee based on the GROSS of the systems revenue, they no longer have to move on when the system shows a loss; subsidies, tax relief measures and wheel taxes provide them with an almost inexhaustible supply of public funds. In some cases NCL first acquired the bulk of the transit properties in an area, subsequently selling out to Metro at a profit.

To most readers, "American Transit Corporation" also means nothing, but they too, are well known in the transit industry although they have not been charged with Federal anti-trust violation. Recently they have been mentioned in the local news as the St. Louis firm which has acquired almost all suburban bus lines in the Greater Seattle area.

Like National City Lines they also own properties in other cities and specialize in motor bus operations. These Companies, although competitors, are apparently on speaking terms with each other, at least Figure 5, following, would seem to so indicate.

A paper on file in the offices of the Washington State Utilities and Transportation Commission in Olympia identified as Cause No. T-9605, dated 26 of December 1962, is a summary of procedure leading up to, and the eventual granting of Suburban Transportation system's application to sell and transfer certain properties to Overlake Transit Inc. The following exerpt reveals American Transit's role in this case:

> "It appears from the information submitted herein that all of Overlake's outstanding capital stock has been purchased by Metropolitan Transit Corporation (Metropolitan Transit), which is not a public

service company subject to regulation by this Commission. It appears, further, that all the capital stock of Metropolitan Transit is owned by American Transit Corporation (American Transit or American), a Missouri Corporation, which is a holding company primarily engaged in the local bus transit business with 20 subsidiary corporations which directly or through affiliates operate local and suburban transit systems in 9 different states."

The State Commission raised several questions. They wanted an explanation of why American Transit was to perform management services for Overlake at the rate of 3% of the GROSS revenue instead of for cost of services rendered. In regard to the sale price, the Commission questioned the difference between Overlake's proposed purchase price of $140,000 and Suburban's, July 31, 1962 depreciated book value of its properties of $44,158.25, which included $11,886.93 of intangible property.

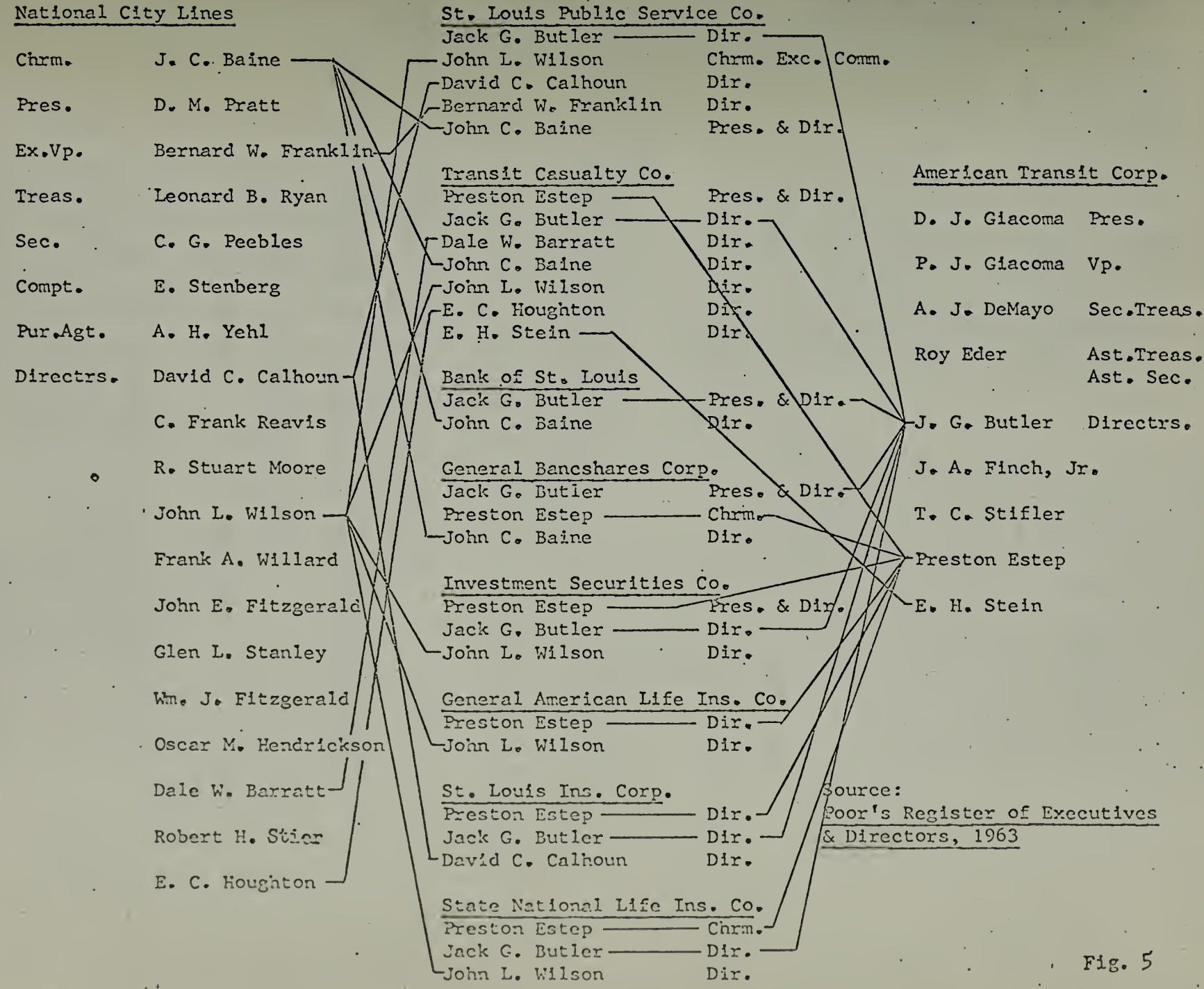
To resolve the issue Overlake submitted a proposal to reduce the reserve for depreciation on Suburban's equipment, thus increasing the pro forma net book value of its tangible property from $32,271.32 to $130,000.00. After some study, this was accepted by the Commission.

The paper also cites a projected estimated net income for Overlake combined with Suburban from a low of $40,035 in 1963 to $73,535 in 1967.

Apparently the same pattern is evolving in the Seattle area as took place in Los Angeles, and more recently in St. Louis, Mo., and Dade County (Miami) Fla. If Metro transit becomes a reality in Seattle, it will be interesting to note how much our Metro will be authorized to pay for American Transit Corporation's holding in the Seattle area and who the men will be who make up the "private management group" of our publicly owned system.

Why is ALL AMERICA going diesel? Why did Dade County and St. Louis go in debt $7 and $24 million respectively, just to go diesel? Why did Oakland junk some $20 million of paid-for electrical system and then go in debt another $27 million or so, to take the train tracks off the Bay Bridge, just to go diesel? THIS IS WHAT THE COST-PER-MILE GIMMICK HAS DONE TO AMERICA. GMC has used it very effectively (see fig. 6).

The late "Engine Charley" Wilson to the contrary: What's good for General Motors is not necessarily good for America.



Source:
Poor's Register of Executives & Directors, 1963

Fig. 5

ARE TRACKLESS TROLLEYS OBSOLETE?

AT A BANQUET held this week in Pontiac, Michigan, E. P. Crenshaw, general sales manager for General Motors truck and coach division asserted that trackless trolleys in the United States are following the street cars into oblivion and stressed the marked increase in demand for diesel-powered buses. Mr. Crenshaw's firm is manufacturing and selling the latter type vehicle and it may be contended that he is prejudiced in its favor. His remarks, however, are of interest especially in these times when city transit systems are finding it increasingly difficult to keep out of the red. He said, in part:

"As of today there have been no orders for trackless trolleys in 1953 and a number of large fleets of trolley buses are being offered for sale."

"There is no escape from sound economics and the continued modernization of all facilities used by man. The paths of many transit systems that used the early and recognized medium of surface transportation — streetcars — have been strewn with financial wreckage. Even the injection of $3 million by the transit streetcar operators themselves to pay for engineering services to improve the streetcar and provide what they thought was a modern electric-driven unit operating on rails could not save that form of transportation. None of these cars are in production now nor have they been for some time.

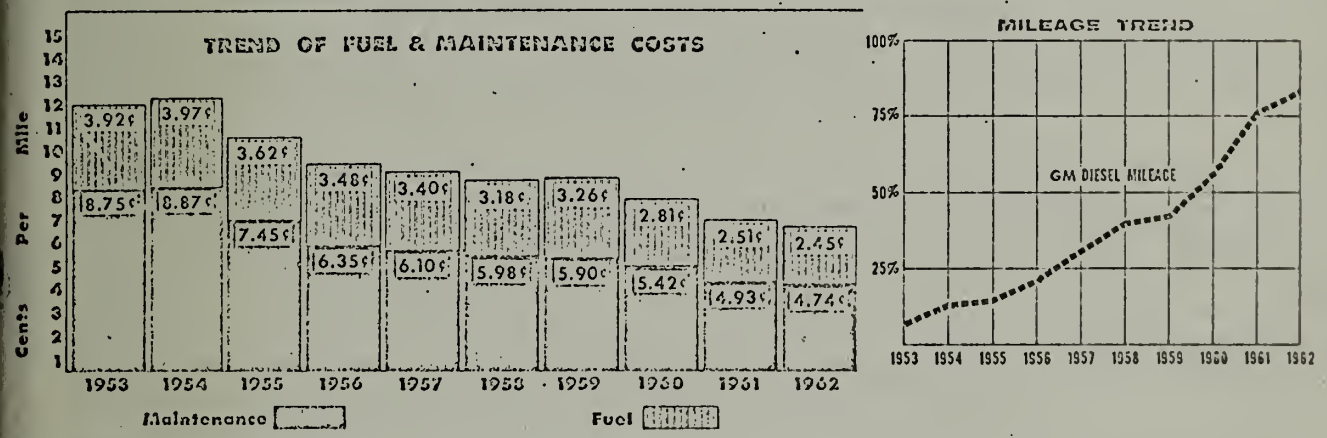
"We have seen many cities, such as Cleveland, Cincinnati, Minneapolis, San Diego, etc., selling their modern cars, replacing them with diesels. They could not afford to pay the differential in operating costs. The excessive dollar investment in electrical distribution systems, wires and poles for streetcars, and the reluctance of the owners to write them off as a loss brought about a 'mongrel' vehicle having a bus body and an electric-driven chassis known as a trackless trolley bus. It was an inflexible and fixed route vehicle requiring a high initial cost and double wire systems.

"After 25 years of unusual selling propaganda, this makeshift move resulted in accumulating a total of approximately 7200 vehicles in use. The year 1952 saw a total production of approximately 320 of which 159 were divided between six companies."

Mr. Crenshaw said that 20,000 General Motors diesel transit buses had been delivered since 1940 and pointed to continuing strong demand for diesels. In 1952 his company delivered 2400 diesel coaches. The 1953 output will equal or exceed that figure, he said.

"We have gone from a solid-tired truck-type vehicle to a floating ride on air suspension; from box-like structures, poorly heated and ventilated to advanced appearing bright metal and picture windows, with automatic air conditioning for summer and winter; from under-powered short-life gasoline engines with clashing gear transmissions to diesel economical engines and automatic hydraulic transmissions giving smooth acceleration. It takes initiative and courage by management to invest the large sums of money needed to make such ideas operative and profitable," the General Motors official concluded.

MOTOR INTERESTS, FRIGHTENED BY THE HIGHLY EFFICIENT TROLLEY, HAVE PUSHED A 'HATE' CAMPAIGN AGAINST IT SINCE THE LATE 20's: THE ABOVE CLIPPING PROVES THE CAMPAIGN'S EFFECTIVENESS !!

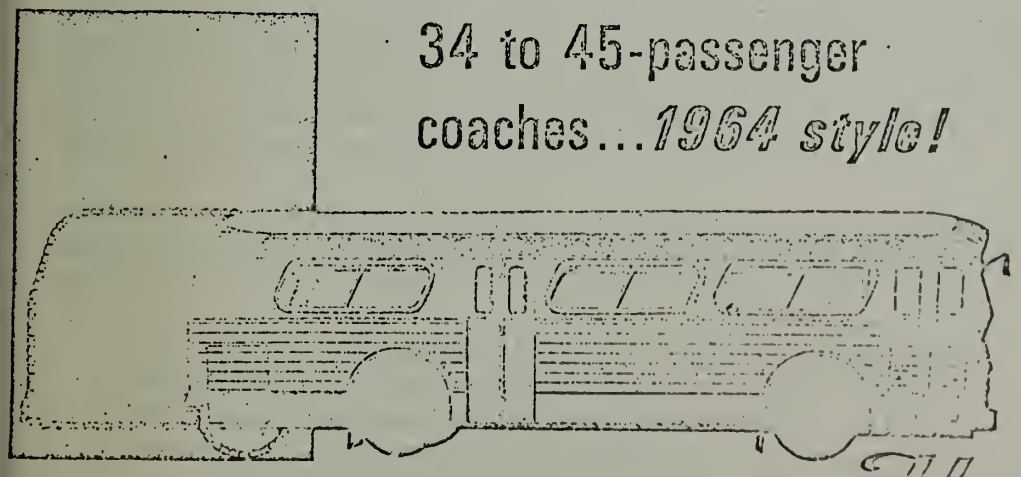


Using A.T.A. account numbers 1304, 1305 and 1315, DSR fleet maintenance and fuel costs declined consistently during conversion to large capacity GM equipment.

Figured on a seat-mile basis, the improvement was even better, thanks to bigger buses. Maintenance and fuel costs per 10,000 seat miles dropped each year, from $35.79 in 1953 to a new low of $14.64 in 1962.

Fig. 6

THE ABOVE REPRINT OF GMC'S AD IN MAY 1963 ISSUE OF "METROPOLITAN TRANSPORTATION," IMPLYING INCREASINGLY EFFICIENT BUSES, ACTUALLY SHOWS HOW INCREASED MILEAGE LOWERS THE COST-PER-MILE. THIS IS A CLASSIC EXAMPLE OF HOW MOTOR INTERESTS USE THIS 'FORMULA' TO ADVANTAGE !



Flxible

THE FLXIBLE CO., LOUDONVILLE, OHIO, U.S.A.

PACESETTER FOR THE TRANSIT INDUSTRY

8 november 63 / metropolitan transportation & planning

THE ABOVE AD HAS A "PLANNED OBSOLESCENCE" TWIST. LESS THAN A YEAR AGO TRANSIT OFFICIALS WERE ARGUING THAT BIGGER BUSES WERE AN ABSOLUTE MUST IN OPERATING AN ECONOMIC SYSTEM !!!

LOCAL TRANSIT POLITICS

Two months before the petition for Charter Amendment Article 24 was written, a news item titled "AID TO TRANSIT IN THE RED URGED", appeared in the San Francisco Examiner on April 24, 1963. Although our Transit system was not then "in the red", our General Manager, attending an ATA Convention was mentioned as follows:

> "Support for public subsidies of mass transit services was also voiced yesterday by Lloyd P. Graber, General Manager of the Seattle Transit System. 'A good case can be made for the theory that transit subsidies produce the lowest total cost to the taxpayer because they defer the need for additional freeways and parking lots downtown.' Graber told a panel session."

We of this Committee are not so naive as to take a stand against subsidies regardless of need, but we are irrevocably against subsidies just to keep diesel busses running, even if this is the national trend.

Why has Seattle Transit Management used such poor judgement in matters involving such large sums of money? Why are they accusing COMET of bankrupting the system when they are doing it themselves? Another purchase of 100 diesels by them, will put them in debt!

The fight by this Committee and others to prevent the purchase of the new diesels by the Transit Commission ended on January 18, 1963, when the order for 90 was placed with Flxible Industries; some four weeks later, Flxible sent a demonstration prototype of the bus we had already ordered, to Seattle to determine its adaptability to our particular terrain. Compared to the trolley it flunked its test, hitting a blurring 12 MPH top speed going up Boeing hill; so then on February 20, 1963 the Commission ordered another 10 busses. This is called research and planning.

Prior to the initial bus purchase, Transit had begun its Trolley junking program. They stated that this was done to obtain "much needed spare parts". Instead of retaining 132 of the 800-934 series Twins (which have many parts interchangeable with the 700 series Brills and the 935-976 Twins) they retained six distinct types of coaches of which the Pullmans, being a war production vehicle, have practically no interchangeable parts. This indicates that the need for spare parts had nothing to do with the junking program. Rather, the trolleys simply would not wear out so in order to get rid of over half the fleet, junking of the smaller coaches was begun using the "spare parts" argument as an excuse.

Another case of poor management combined with an attempt to hide the true facts from the taxpayers who own the system, is best illustrated by a footnote appearing on pages 6 & 8 of the October 1963 Financial Report:

> "Because of the major change in operating equipment in 1963, comparisons of dollar expenditures no longer have any meaning. However, cost per-mile is a comparative figure, so monthly and year-to-date percent of increase or decrease will be shown on a cost-per-mile figure."

The foregoing quote is a double-barreled shotgun pointed right at the solvency of our Transit system.

For years, the trolley coach operated the greater number of the total Transit system miles and on a greater mileage-percentage-basis, carried the 'lion's share' of the total administrative and garage expenses. These costs, in many cases, involved either exclusive or predominately motor bus facilities. Battery shop, fuel pump, water hose costs etc., are motor bus functions by virtue of usage but have not been carried as direct motor bus operating expense and have therefore been borne in part, by the trolley coach.

Transit has often quoted the dollar expenditures in comparisons, to point up an implied exorbitant trolley coach cost. As recently as last September, Transit's Public Relations Director quoted the August Financial Report, and compared the trolley coach's $1.00 cost-per-mile to the 62 cents-per-mile for the motor busses. It would not do however, to tell the public that in the month of June alone, the trolley coach was charged with one-half of nearly 30 thousand dollars of Traffic Promotion and Advertising Cost of the 'Pure Swank' diesel propaganda.

The diesel, unlike the trolley, cannot show a profit above its expenses even under ideal conditions. Now that it must suddenly shoulder the burden, Transit management is more than eager to hide behind the cost-per-mile gimmick.

Coupled with attempts to hide certain facts is Transit's penchant for misinforming the public. Such fantastic statements as, "Even if electricity were free it would (still) be cheaper to power a diesel." are indicative of both 'wild' bookkeeping and 'wild' public relations.

NEITHER CAN REPEAL THE LAWS OF PHYSICS!!!

We cannot help but express ridicule and amazement at anyone who would argue that the diesel could possibly be as efficient as the trolley. The known characteristics of the two types of motors and known inequities in Transit's 'cost comparisons' precludes any such conclusion.

As far as relative cost is concerned, let us look at the records and compare the cost of all the kilowatt hours consumed by the trolleys from 1939 through 1962, with what we, the owners of the system, have paid for fuel and engine oil for busses during the same period.

Neglecting overhead track and feeder maintenance which is more than offset by the much higher garage costs, fueling costs and the 2 to 1 ratio of 'motor over trolley mechanics' costs for the motor fleet, the comparison looks like this:

Engine fuel & oil	$8,801,275.44
Kilowatt hours	7,654,813.04
Amount favoring trolleys	$1,146,462.40

It should be noted that in the same period of time, the 307 trolleys logged 49,727,098 more miles than the 550 busses that S.T.S. had owned and operated as of the end of 1962, of which only 208 were left.

Of the 8.8 million dollars spent on fuel and engine oil, most has gone out of state; of the 7.6 million dollars spent for KWH's all has gone to City Light, to boost our city economy.

Transit management may argue that the 8.8 million dollars is more than they actually paid for fuel and oil because, from June 1957 through 1962, the motor bus fleet has been subsidized by more than half a million dollars through a state fuel tax exemption. This subsidy which has come from us as state taxpayers has increased appreciably in 1963 with the increased diesel mileage. When Transit's dieselization is complete, the increased work-load and mileage of the diesels will raise our subsidy to a minimum of a quarter of a million dollars per year.

Transit Management has spent over 9 million dollars for motor-busses in the past 23 years, apparently without ever having referred to its own financial reports as a guide in equipment replacement. This is mismanagement bordering on irresponsibility in handling public funds.

The only years in the history of transit that the motor fleet ever made a profit were 1942 and 1943. The best was 1943 with a motor fleet net farebox profit of 2.6 mils per mile run, as compared to almost 20 cents for the trolley, yet transit management continued buying motor busses. Early in 1948 after a net farebox loss of $956,758.56 in 1947 as compared to a net trolley profit of $1,338,993.53, Transit promptly bought 100 new gas busses. The following year was the first in which trolley earnings failed to make up for the increased motor bus losses.

In spite of the Cincinatti and Memphis tests and the "handwriting on our own wall," Transit management's unshaken faith in the Diesel Bus has led it to subscribe to such inane reasoning as, "we may lose a little on each patron but high volume will make up for it".

In 'study after study', Transit management has completely ignored its own excellent and qualified engineering department in favor of questionable research promoted by public relations propaganda.

One of the most amazing aspects of this dieselization program is the wholehearted support it has received from the Chamber of Commerce and the Central Association. These organizations without even bothering to hear both sides, have apparently convinced themselves that the noisy, cumbersome diesel busses, emitting their "sweet smell of failure" can make the central business district more attractive to their customers and clients.

It seems that reduced off-peak transit fares for senior citizens and shopping mothers carried on quiet, clean and efficient electric vehicles would accomplish far more toward this end.

It is obvious that Transit's threats of 'catastrophic costs and bankruptcy' with a return to a predominance of electric operation could only come true through a deliberate mismanagement of the system.

There is no need to continue. We, as a group, urge that the Transit Commission and management speak out with something other than propaganda. They should not only explain their past mismanagement but tell the public just what they plan to do in the future, backing their plans with sound economic facts rather than the cost-per-mile fairy tale. We sincerely feel their first move should be to stop spending public money on false advertising in an effort to influence the election.

DIESEL AIR-POLLUTION

"I HOPE THE PETITION SUCCEEDS." These words of S. Smith Griswold, Air Pollution Control Officer for Los Angeles County, were reported by the Times on November 11, 1963 and were made in criticism of Transit management's elimination of electric trolleys in favor of diesel busses.

In a Special Feature Press Release issued in Geneva last December, The World Health Organization, reviewed the studies of its first Expert Committee on the Prevention of Cancer: "It is generally accepted that atmospheric pollution is a factor of importance in the causation of lung cancer in man." Their suggested preventive measures included, "...increased use of hydro-electric power".

In view of national and world-wide concern, nothing should be done to increase the air pollution problem. The dieselization of an electric transportation system which is paid for, solvent and debt free is unthinkable, especially in a low cost, hydro-electric area.

One of the many advantages of electricity over diesel, is that no combustion takes place in the operation of the electric motor, while any petroleum fuel engine's operation, results in inefficient combustion and the exhausting of various compounds into the atmosphere which are injurious to health. Some of these, known as "photo-chemical", are relatively harmless until acted upon by sunlight while most of those due to the imperfect combustion of diesel fuel are injurious upon emission.

The Transit Commission is right in its contention that the diesel bus contributes very little to photo-chemical smog. However they dare not discuss the diesel's contribution to injurious air pollution.

The chemistry of diesel air pollution results in several poisons being exhausted into the atmosphere. One such product is nitrogen dioxide. This, being photo-chemical, is by action of sunlight dissociated into nitric oxide and nascent oxygen. The nascent oxygen reacts with organic matter to produce formaldehyde and petracyl nitrate, both injurious to health. In addition, up to one percent of diesel fuel is sulphur which, due to incomplete combustion, results in sulphur dioxide.

Concerning diesels, sulphur and the London deaths in 1962, Newsweek Magazine of December 17, 1962 said:

> "...but levels of sulphur dioxide, which is produced by virtually all fuels, were the highest in the city's history. A possible explanation, researchers said, is a big increase in the use of diesel powered trucks and other vehicles by Britons over the last ten years... ...Sulphur dioxide, one theory holds, is one of the most noxious components of smog. For, combined with moisture it produces sulphuric acid. "And that's what we're breathing," said Dr. Mary Catterall of Leeds General Infirmary last week. "It eats into buildings, motor cars, and worst of all, our lungs!"

Concerning the Los Angeles problem, Dr. Arie J. Haagen-Smit of Caltech, who was a pioneer researcher on the chemistry of smog in the late 1940's, said in 1962: "IF THE ANGELENOS WANT REAL RELIEF THEY MUST HAVE BETTER, AND PREFERABLY ELECTRIC, PUBLIC TRANSPORTATION....."

WHAT ARTICLE XXIV MEANS TO YOU

In order to see the complete financial picture if Article 24 becomes law, we must first examine the situation if it does not:

As of last December, after purchasing the new diesels, Transit had $2,581,894.28 in its Renewal & Betterment Fund (R & B Fund). At present it has a total of 509 revenue vehicles of which 201 are trolleys. This fleet, and the R & B Fund are basically what Transit management will have to work with at the time of the March election.

If Article 24 fails to pass, Transit management will be faced with an expenditure of another $2,700,000 in purchase of 100 more vehicles to replace the old Twin-Fageol gas busses bought in 1948. These busses, known in transit as the "babied fleet" are still operating only because of high cost maintenance.

This fleet replacement will put STS in the red some $100 thousand. In addition, City Light's rectifier sub-stations, made useless by this first stage of the diesel program, have an undepreciated balance of about $600 thousand, and whether City Light or Transit absorbs this loss, it represents our money thrown away.

This, combined with no interest income from an R & B Fund, makes a grim picture if Article 24 fails to pass. Certainly, within a year or so, this will be a reality. How, then, can they argue that the present R & B Fund is "earmarked" for new garage facilities? How can they earmark money already spent?

If Article 24 is ratified at the polls, the problem facing Transit management, and our suggested solution would be as follows:

North End Service: All trips (including express service) to 145th will remain the same. All trips now terminating at the end of existing trolley overhead track would be served by trolleys instead of diesels or motor busses.

West Seattle Service: About 1/2 mile of overhead track and feeder has been removed, ostensibly to allow construction of the Spokane Street viaduct extension. Transit is the only utility which removed its facilities, City Light and the Telephone Company are rerouting their services in this area.

Our recommendation is that this portion be restored and the routes then be served in the same manner as suggested for the north routes. The Overhead Dept. of STS estimates this would cost between 10 and 15 thousand dollars. This is the first time that overhead plant facilities have ever been removed rather than relocated to make way for construction projects.

For the purpose of illustration as to what could then be done in utilization of equipment, we have analyzed the #5 Phinney line. The weekday schedule effective as of December 16, 1963 for this line is as follows: Inbound trips 97, outbound 99, for a total of 196 one-way trips per weekday.

Of the above total, 66 trips (which include 9 express runs) go beyond the 85th Street trolley tracks. These 66 trips would remain unchanged, travel being between the central business district and 145th, so that no transfer would be required at 85th Street. The remaining 130 trips would be served by the trolley coaches.

In an analysis of another route extension not so typical as the Phinney line, our recommendation is the same, except that an alternate suggestion could be used. This is the 15th NW (85th-105th St.) line. Since the trolley track ends at 85th, and since out of a total of 150 one-way trips, 84 extend beyond the overhead plant facilities, and since further that the extension is only 20 blocks, it would seem advisable to explore the possibility of electrifying these last few blocks and running all trips with the trolley except possibly 9 or 10 diesel express trips per weekday. This would make this particular line much more profitable to the system and the investment of only $20,000 or so would amortize out rapidly.

As to the availability of vehicles if our Charter Amendment passes, a spot check review of the maximum number of coaches scheduled is important. As of the 1st of October 1963 STS maximum scheduling for weekdays was: Busses 283; trolleys 99; for a total of 382.

By utilizing 101 more of the trolleys still extant, and reducing the scheduled busses by 84, the management could thus conform to the requirements of Sec. 2 of Article 24, and still utilize a total of 17 more vehicles than they are now scheduling without the necessity of purchasing a single additional trolley coach: Trolleys 200; Busses 199; totaling 399.

Since STS has a fleet total of 509, they could retire the 100 Series Twin-Fageol gas busses and with no new vehicles, would still have 126 more vehicles than they were scheduling as of the 1st of October 1963, and would have 42 more vehicles than were on the routes as of June 3, 1963.

If Article 24 passes, the total cost could come from the R & B Fund rather than the taxpayer. The breakdown of cost per our recommendation is as follows: Renovation of 69 trolleys at $2,500 each = $172,500; Rebuilding Spokane Street overhead = $15,000; 15th NW extension = $20,000: for a total cost of $207,500. This would leave a balance in the R & B Fund of about $2,392,000.

If Article 24 fails, the cost looks like this: Undepreciated City Light substations = $600,000; replacement of gas busses = $2,700,000 for a total of $3,300,000 and instead of having $2,400,000 in the R & B Fund drawing interest there would be a deficit of $700,000. Total at stake at the March election is as follows:

If Article 24 passes	= plus	$2,392,000
If Article 24 fails	= minus	700,000
MONEY SAVED IF ARTICLE 24 PASSES		$3,092,000

The foregoing is not the ultimate in modern electric transportation; but it would result in a profitable interim system by which the extended service could be retained and profits earned until a modern automated central radial system, running on its own right-of-way to the outlying areas, could be planned and financed.

This, combined with lateral trolley lines feeding the terminals of the r dial system (with a full utilization and expansion of the existing, odern 14 substation and feeder network), would give Seattle an extremely profitable transit system with excellent service to the patron.

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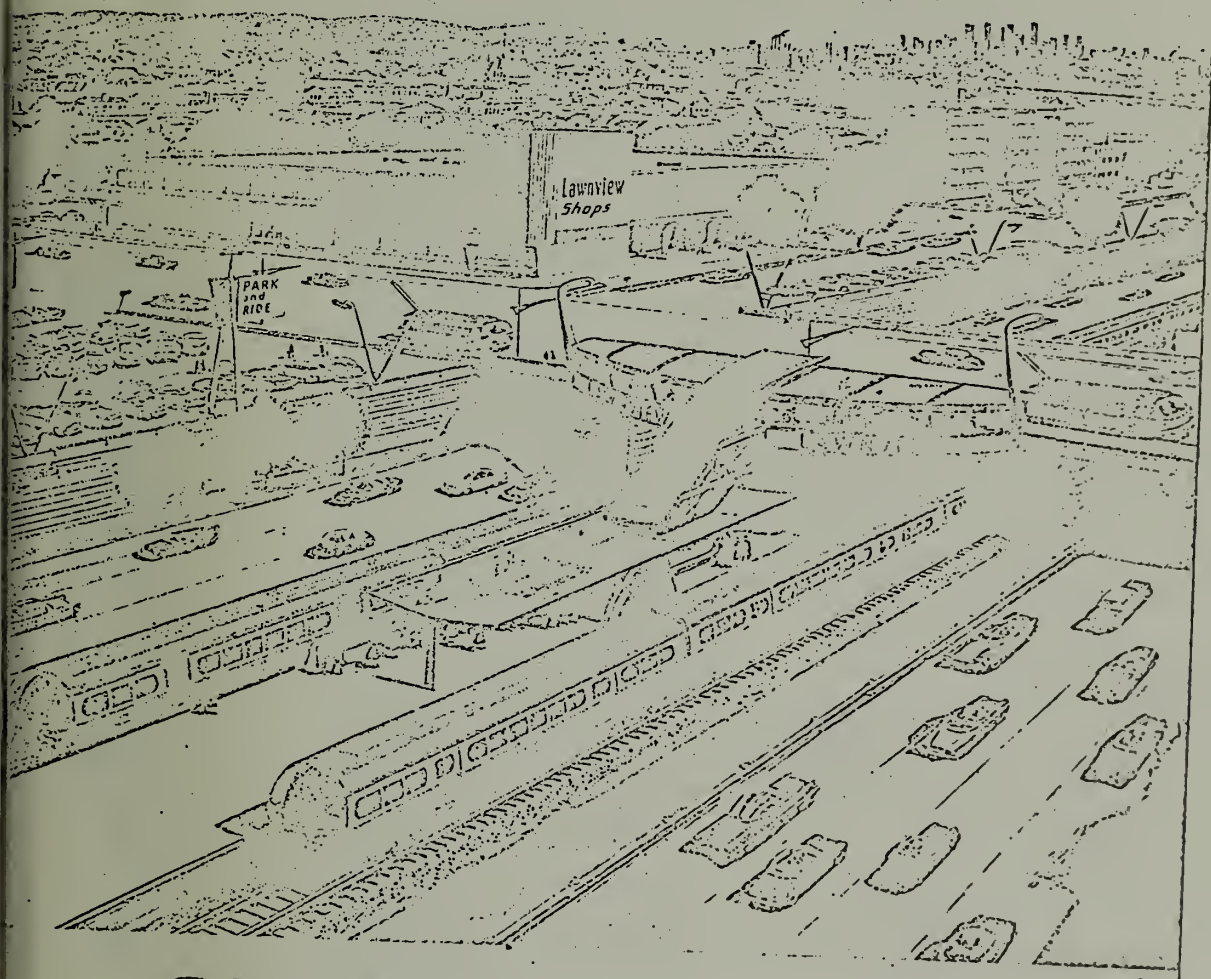
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GENERAL ELECTRIC

E YES/on ART. XXIV

ACTION IN TRACTION

Although the vehicle you're looking at does not run on rails, it is almost as important a development as the PCC car was in the 30's. The trolley coach shown above, owned by the Toronto Transit Commission, is probably one of the world's most modern trolley coaches. It was designed and engineered by the Western Flyer Coach, LTD. of Winnipeg, Canada. The TTC dismantled a 37' Brill trolley coach (I believe it was 9020), reworked all the electrical equipment to put it in top operating condition, and then forwarded it to Western Flyer Coach to be incorporated into the new coach.



The coach has fluorescent lighting (which does not flicker at special work), color coordinated interior, stained glass, air ride, ultra modern seating and makes extensive use of reinforced fiberglass to reduce corrosion and improve insulation. Control and acceleration are superior.

Another such vehicle is currently being designed and built for the TTC by Flexible Coach, LTD., in England. The Commission is contemplating the rebuilding of all present trolley coaches to a design comparable to that shown above. In addition, it is possible that some heavy Diesel bus lines may be converted to trolley coach. One thing I promise you: No one will get sick from fumes from this one!!—Robert J. Halperin.